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CHEMISTRY AND MEDICINE.¹

By ALLAN S. WALKER, M.D.,
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I WISH to express my appreciation as a member of the British Medical Association of the privilege of addressing the members of the Australian Chemical Institute at this combined meeting. In traversing the field of medicine and attempting to touch on its relationships with the science of chemistry and its many debts to the work of chemists it will be impossible to do more than make a very superficial survey of the subject. I had not realized fully how great our dependence

¹ Condensed from an address delivered at a combined meeting of the Australian Chemical Institute and the New South Wales Branch of the British Medical Association on May 18, 1938.

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upon chemical science was until I began to review the field in my mind. It is remarkable how recent, comparatively, is the expansion of the chemical side of medical science. It seems strange that it is not one hundred years since Garrod recognized the increase of uric acid in the blood, and it seems stranger still to me to recall that when I entered the medical school as a student the estimation of glucose in the blood could not be simply and reliably carried out, whereas now any technician with a reasonable aptitude may readily be taught to carry out this analysis, using only a few drops of blood.

To go back to history for a moment, it is interesting to reflect that nearly 2,000 years divide Empedocles, of 450 B.C., with his belief in four elements in the human body—earth, air, fire and water—from Paracelsus in the sixteenth century A.D. Paracelsus was undoubtedly a charlatan; but

he is credited with the introduction of opium, iron, lead, sulphur, arsenic and copper sulphate into clinical medicine. The next few hundred years saw the building up of an elaborate pharmacopœia, thanks to the introduction of chemical methods of preparation and assay. Modern chemistry is now revolutionizing our pharmacopœia in several ways: by preparing pure products, isolating active principles, and insisting on a rigid standardization. You will remember the cynicism of Oliver Wendell Holmes: "If the whole of the *materia medica* could be sunk to the bottom of the sea it would be all the better for mankind, but the worse for the fishes." From the point of this gibe we are rapidly escaping, though we must admit that our pharmacopœia still contains many galenical preparations, infusions, tinctures, decoctions and the like, whose action, if any, is uncertain and whose strengths are by no means constant.

In this matter of drugs we depend entirely upon the chemist for the purity of the product, even in the case of the simplest salts. You may recall "Dr. Jekyll and Mr. Hyde" and remember how the unfortunate doctor, in making a fresh brew of the unholy compound which split his personality into such a tragically opposed pair, found that his preparation was inert. There had been some unknown impurity in the previous components, the action of which was necessary for the mutation of the terrible Hyde to the benign Jekyll. Had poor Jekyll had the advantage of a modern chemical service, Stevenson's story might have ended differently.

Many simple examples might be quoted of this need for purity in a simple salt. Bismuth, for instance, is usually administered in the form of an insoluble salt, and frequently in quite large quantities. We are usually secure in our confidence that it is quite harmless, though incidentally it may be remarked that an extraordinary case of "bismuthia", or universal pigmentation of the skin due to the taking of large doses of bismuth by mouth for years, has been reported. Were we doubtful as to the presence of other impurities, such as arsenic, this confidence would disappear. It may not be irrelevant to recall an epidemic of peripheral neuritis which once occurred in Manchester, due to the presence of arsenic in beer. Barium is another excellent example. Tragic results have followed the accidental substitution of a soluble barium salt for the sulphate used extensively for opaque meals in radiological work. These illustrate how utterly dependent the doctor and the great self-drugging public are upon the chemist to ensure the purity of even the simpler drugs.

Organic Drugs.

A more complex and interesting field is opened up in relation to the organic compounds. Let us first take the matter of active principles, the isolation of which from the more or less crude original substance has done so much for therapeutics. Quinine from cinchona bark, morphine and other alkaloids

from opium, strychnine from *nux vomica*, atropine from belladonna; these are outstanding examples. Of all alkaloids, morphine is the most important; and the preparing of this and similar drugs in a form suitable for hypodermic injection was one of the really great advances of pharmaceutical chemistry. Some of the glucosides are very important, in particular those present in digitalis leaves. The history of digitalis probably begins with the old wives and other empiricists, who found out some of the properties of foxglove, and it goes on through Withering, who introduced it to medicine, up to the pharmacologists who assayed it and tabulated its effects, and finally to the chemists, who have given us the pure glucosides, like digoxin. Digoxin is derived from one variety of the plant, *Digitalis lanata*, and is so definite a compound and can be prepared with such accuracy and in such a pure state that it needs no standardization on the frog's or cat's heart, as do some other preparations. It is remarkable to be able to watch the totally irregular heart slow down and become reasonably efficient, the kidney function become reestablished, and a massive dropsy lessen and perhaps disappear with minute decimals of a gramme of this well-defined chemical substance, the identity and purity of which are sufficient warrant of its standardized action.

Still more fascinating is the synthesis of active principles, such as ephedrine, which is useful as a substitute for adrenaline in asthma. Perhaps the public is not so impressed by synthetic ephedrine as by the natural product; for patients are often thrilled to be taking the ancient Chinese herb *ma-huang*, which appears to appeal to their imagination more than any mere product of the fields and laboratories of the western world.

But a still wider vista is opened up by the consideration of the synthesis of more or less simple inorganic or, more particularly, organic compounds to produce fresh ones. One of the most famous of these is "Salvarsan", the famous "606" of Ehrlich, a masterpiece of patient applied chemistry. Take the example of the myriad members of the barbituric acid family, like phenyl-ethyl-barbituric acid or phenobarbital, the original "Luminal" of Bayer. Not only are these drugs of peculiar value as sedatives or hypnotics, but they illustrate one of the mysterious and curiously valuable properties of many chemicals, selectivity. Bromides act more particularly on the higher centres of the brain, the cortical areas, whereas the barbiturates have a special affinity for the diencephalon, containing the instinctive groups of nervous centres. It is this fact which makes this group one of the most popular of sedatives, for depression of the emotional centres of the brain can be achieved without much interference with the higher powers of thought, although like all drugs it is not free from toxic properties, such as the rare causing of a skin rash, or giving rise to incoordination and loss of memory. Other and older synthetic substances are the coal-tar series, such as phenacetin and phenazone, so useful in the relief of pain. These substances, like many

of the most interesting compounds in our living world, contain that talisman of modern chemistry, the benzene ring. You may remember how Kipling, in the story "They", described how a blind mystic who was apparently versed in the symbolism of oriental philosophy, "traced the outline of the Egg which it is given to few of us to see". Today, if the modern chemical magician traced an occult symbol, it would surely be not the mysterious oval, but the hexagonal outline of the benzene ring.

Touching on these compounds brings me to the riddle of toxicity of drugs. This problem is two-fold. First there is the puzzle of idiosyncrasy. Why should some persons be so sensitive to aspirin that one tablet will promptly cause a swelling of the face? Or why will iodine or adhesive strapping in some produce a profuse crop of blisters? The answer must be in the intimate cellular mechanism of the body, and will surely be gained only by chemical means. The other side of the problem is perhaps simpler, but as yet it is obscure. Two drugs built up on the benzene ring or other linkages may have almost identical constitution, yet the mere addition of, say, an NH_2 group may transform a safe drug to a dangerous one. These two problems are well illustrated in amidopyrine. This is a first cousin of phenazone, and in a few susceptible or sensitized persons it may cause a serious and even fatal poisoning of the blood-forming tissues of the bone marrow. The white blood corpuscles are chiefly affected in such cases; they cease to enter the blood stream, and may even cease to be manufactured, so that the patient is deprived of one of his chief defences against infection. As a result of this septicemia may occur, usually with fatal results. This is apparently due to a small change only, a CH linkage in the pyrazolon ring (which is attached to a benzene ring to make phenazone) being merely replaced by $\text{CN}(\text{CH}_3)_2$. The toxicity of some drugs can be understood or even foretold; but the riddle is not yet solved and awaits further chemical research. That there is a stupendous future in synthetic drugs is certain. There is no end to the ingenuity of the chemist or to the cautious patience of those investigators who study the properties of new compounds; and if only an occasional success crowns their toil they must remember Ehrlich and their other great exemplars. A striking victory is seen in the recent introduction of the sulphanilamide group of drugs. In spite of growing evidence that these drugs have toxic potentialities, they are one of the great advances of modern years. It is amazing to think that streptococcal and certain other blood infections can be cured in numbers of cases merely by giving a few tablets by mouth over a short space of time. It was a tragic event when an elixir of sulphanilamide was found to be so highly poisonous in America recently; but even the very fact that it was discovered that the poisonous action was not due to the drug *per se*, but to the solvent used, shows how utterly dependent not only upon the resource, but also upon the integrity of the chemist we are.

I can only briefly refer to the part played by chemistry in anaesthesia. The purity of simple liquids like ether and the now seldom used chloroform is a vital necessity; but even greater care is needed with the gases now coming into more frequent use, like the well-tried nitrous oxide and the newer ethylene and cyclopropane. Then there are the valuable substitutes for the toxic cocaine used in local anaesthesia; it is the introduction of "Novocain" and similar products that has made certain types of surgical work possible.

While we are on the subject of therapeutic substances, antisera of different kinds may be mentioned. Not only can the chemist concentrate and isolate potent toxins, from which antitoxins may be prepared, but, when the patient animals provide us with their protective serum he can also largely remove the toxic proteins foreign to the human body, thus making the product more safe and potent. A simple and partial precipitation by ammonium sulphate, for example, is one of the devices by which diphtheria antitoxin can be concentrated many times. So, too, the diphtheria toxin used for immunization can be modified, as, for instance, in the alum-precipitated toxoid. Before leaving the subject of drugs, let me quote what H. G. Wells says in "The New Accelerator". He says:

The marvel of drugs has always been great to my mind; you can madden a man, calm a man, make him incredibly strong and alert, or a helpless log, quicken this passion or allay that, all by means of drugs.

It is evident, then, that for the physician to use drugs properly he must understand their action and toxicity, and be aware of the possibility of idiosyncrasy; but he must first be given the drugs to use, and they must be pure and stable.

The Analysis of Foods.

A subject that demands brief mention is that of the analysis of foods. Food is probably the subject of more faddism and quackery than any other essential of our lives. There is a good deal of sense spoken and written about it, but more nonsense. There is, of course, probably a great future in the scientific chemical control of food. We know of some chemical deficiencies in diet; for instance, calcium and iron are sometimes lacking; but there must be others of which we know little or nothing. In diabetes diet finds its chief triumph, and the aim of the doctor now, either with or without the use of insulin, is to provide the patient with a dietary not only safe and adequate, but also pleasant and palatable, not too expensive, and composed of ordinary foodstuffs, so that the diabetic may mingle socially with his fellows at meals without undue restriction. We must take off our hats to those chemists who have painstakingly analysed thousands of samples of foods all over the world. This work is boring and monotonous to a degree; it has been repeated again and again in various parts of the world, and sometimes newer knowledge, as for instance that concerning the significance and availability of sugars in food, has

necessitated a revision of existing figures. But it is on these results that all sound dietetic methods are based.

The Chemistry of the Human Body.

A still more fascinating subject is the chemistry of the animal body, particularly the human body, in health and disease. It is interesting to take some examples of how chemists have shed light on many physiological processes by studying the simple salts of sodium and potassium. It is, of course, well known, and indeed obvious, that our well-being depends upon the integrity of the osmotic pressure of the fluid of which our bodies are largely composed. Since more than half the body, roughly about 60%, is made up of water, and about two-thirds of this is actually within the body cells, it is essential that such variations as occur in osmosis should be strictly controlled. Simple deprivation of water alone will lead to a fall in volume and a rise in osmotic pressure in the blood and other extracellular fluids. The passage of the products of metabolism between these fluids and the cells is hindered and kidney function in particular will suffer. This form of imbalance is simply restored by taking water. The ingestion and absorption of an excess of water on the other hand can cause toxic symptoms, such as convulsions. It may be remembered that the forced swallowing of huge quantities of water was one of the forms of mediaeval torture. But suppose the loss includes other substances, salt for instance. The most familiar example is seen in the so-called "fireman's cramp", in which quantities of water and salt are lost in sweat: if the man takes large draughts of water he upsets the osmotic equilibrium and has cramps, which can be simply cured by salt. The provision of salted beer for miners in certain deep and hot mines is based on this observation. The loss of salt and water by sweat is not so innocent a matter as might be thought. When it is realized that in hot climates, as in certain parts of India, the excretion of sweat may reach seven litres a day, and that this entails a loss of about twenty grammes of salt daily, it will be seen that replacement of such loss is a serious and important consideration. In diabetic coma dehydration is also common. Sometimes it progresses to an extraordinary degree. Here, too, salt is lost, and though the mechanism concerned is complex, the replacement of the missing saline fluid is not difficult. It is believed that most of the intracellular osmotic pressure is due to potassium ions, and the extracellular fluid osmotic pressure to sodium. Of the possibilities of the play of sodium against potassium and other electrolytes in the body there are some interesting examples. One of the most striking is found in Addison's disease, in which the cortical part of the adrenal gland is defective or diseased. Amongst other curious results of the lack of this cortical adrenal hormone are the familiar low blood pressure, nausea, pigmentation of the skin and a remarkable degree of bodily weakness. But a more interesting feature to us at the moment is the

extraordinary disturbance of sodium metabolism. Although an extract made from the adrenal cortex will rescue a laboratory animal from an acute adrenal crisis and will give corresponding benefits to human patients, the administration of a simple powder of sodium bicarbonate, sodium citrate and sodium chloride will improve such patients greatly. One patient before coming under treatment used to visit the salt-box in her kitchen frequently, and, blindly obeying the urgent promptings of Nature, would take quantities of table salt each day.

More interesting still is the recent work on the rare disease familial periodic paralysis. The sufferer from this malady may wake up to find his arms and legs paralysed, a condition which will persist for hours or occasionally days and then pass off completely, to return at variable periods. Certain things have been observed to bring on attacks, such as heavy meals before retiring, or excess of carbohydrates, especially sweets, in the diet. The finding by English investigators that the paralysis is related to a drop in the potassium content of the blood is most illuminating. In one case chemically studied they found that the blood potassium content dropped during an attack to one-half its previous figure. By giving glucose by mouth an attack could be precipitated; but twelve grammes of potassium chloride would promptly relieve the patient of paralytic symptoms. It is known that the absorption and utilization of sugar in normal people cause some degree of potassium shift from the blood, and in the subjects of this strange disease there is apparently some curious chemical anomaly, part of which is an undue decrease in the serum potassium. This is an illustration of the chemical research in rare diseases; the knowledge gained frequently sheds light also upon the processes of normal physiology. The same may be said of certain other of the less common disorders. For example, the calcium-phosphorus balance of the body has been the subject of intensive and painstaking study, and most interesting results have been obtained. The surgical removal of the thyreoid gland not uncommonly causes interference with the parathyreoid glands, and the disturbance of calcium balance that is thereby caused may produce muscular cramps or even the condition of tetany. This is usually simply relieved by calcium, and it may be remarked in passing that the introduction of calcium gluconate into medicine has been welcome, since the chloride is not only unpalatable, but has the drawback of upsetting the acid-base regulation when large amounts of the chloride are absorbed. Much more fascinating is the extraordinary condition in which gross distortion and deformity of the skeleton occur as a result of abnormal parathyreoid activity. This is usually due to a parathyreoid tumour, and it is remarkable to reflect that careful chemical analysis of the intake and output of calcium and phosphorus will enable the physician and surgeon to predict with reasonable certainty the presence of a tumour in one of four or five places where it usually can neither be seen nor felt.

Idiopathic steatorrhœa must also be mentioned briefly on account of its remarkable nature. In this disease there is a defect in intestinal absorption; fat is not absorbed and the patient loses weight; vitamin *D* and calcium are also lacking, and rickets occurs in the child, or thinning of the bones, with perhaps spontaneous fractures in the adult; iron is not absorbed and a simple anaemia follows, or the essential blood-forming substance is lacking, resulting in anaemia resembling pernicious anaemia. It is a disease of great interest in one regard, inasmuch as it is so highly characteristic that it may be instantly recognized when well developed by any observant physician who has seen similar cases; yet the diagnostic proof and the investigation of the nature of the defects involved require quite complex chemical studies.

Iron metabolism is also full of interest. Some of the seemingly simplest of problems are not yet quite solved. Iron is, of course, necessary for the production of that remarkable substance haemoglobin; but why should iron deficiency anaemia be so common? Where the diet is grossly lacking in iron it is easy to understand; but there is apparently more in it than this. Is the deficiency in absorption or in utilization, and why should it be necessary to give iron in such huge doses as we use at present in order to restore the low red blood cell count to normal? This riddle awaits further illuminating work by biochemists, though perhaps here, as in other cases, they may find some cues in the study of a rare disease, such as haemochromatosis, the so-called "bronzed diabetes". The pigmentation of the skin, the deposit of haemosiderin in the internal organs, with the specific degenerative changes in the liver and pancreas, point to some perversion of the whole iron metabolism; but cause and cure (if any) are quite unknown.

In the diagnosis of disease the chemist is daily invoked. It is a truism to point out how the study of chlorides in the cerebro-spinal fluid may help to a diagnosis of tuberculous meningitis, how important is the estimation of the sugar content of the blood and urine in diabetes, how significant the estimation of urea and creatinine in the blood in renal disease, or how the simple demonstration of a normal concentration of hydrochloric acid in the stomach will make the presence of a cancer in that organ unlikely.

Perhaps one of the most fascinating series of chemical performances is that leading to the discovery of the chemical mediators of nerve and muscle action. The surmise that nerve endings in muscle might generate such substances is now a proved truth, and that the sympathetic nerve endings generate adrenaline and the parasympathetic endings and others acetylcholine is now well known. But here again the light thrown upon normal physiological processes by the study of rare disease is clearly evident. The recent researches on *myasthenia gravis* are of extraordinary interest. The nature of this disease is of itself remarkable

enough, and no one who has seen a case could forget the characteristic feature of the disease, the incapacity of certain muscles, particularly those of the eyes, face and throat, to recover from fatigue without prolonged rest. It is strange to see the patient open his eyes a number of times and then to see the lids droop powerless until rest has restored their function, and still more strange to see a temporary restoration almost to normal by a dose of "Prostigmin". The fault here is undoubtedly at the neuro-muscular junction, and is certainly chemical; but at present it seems doubtful if there is a lack of acetylcholine or an excess of the esterase which normally counteracts its action. The former seems more likely. The bearings of such studies on muscular action will be obvious. An interesting point in the action of these chemical mediators of nerve action is concerned with the pharmacology of ephedrine. This substance, so largely used as an oral substitute for adrenaline, is able to inhibit the amino-esterase which is supposed to destroy adrenaline soon after its liberation at sympathetic nerve endings. The action of ephedrine therefore appears to be to augment the action of the sympathetic nerves, or at least to prolong it.

Two still more specialized subjects I have to touch on very briefly: the nature and action of the vitamins or accessory food factors, and of the internal glandular secretions, both in essence purely chemical subjects.

The Vitamins.

It is stimulating to reflect that if Hopkins had not exercised his scientific imagination and experimented on the effect upon rats of a pure chemical diet, we might still be ignorant of the vitamins. Certain broad principles concerning the constitution of these substances may be mentioned. It may be remarked in passing how the word "vitamin" itself enshrines a false concept as regards chemical structure, just as do "uræmia" and other pseudo-descriptive terms. It is worthy of note that two vitamins, *A* and *B*₂, are closely related to pigments. The subject of pigments in relation to physiology is but little understood. With due respect to biochemists, we know only a fraction of what is yet to be learned. Vitamin *A* is interesting in view of its derivation from carotene by a process of hydration, and also as regards its bearing on retinal function, being concerned with the readjustment of the visual purple after stimulation. Further, not only is night-blindness caused by a lack of vitamin *A*, but observations upon eyesight may be used as a check on a sufficiency of this substance in children and others. Vitamin *B*₂ is also allied to a yellow pigment, and has for some time been known to be related to nicotinic acid. This latter fact has virtually been rediscovered lately, and it is interesting that nicotinic acid has been used with success in the treatment of the deficiency disease in dogs known as "black tongue", and has been thought by some observers to have effect in human pellagra also. Vitamin *D* is, of course,

ancient history now, and it is well known that it is derived from a sterol. One very valuable service rendered by chemical science is the provision of vitamin *D* in concentrated form. An example of the importance of this is seen in the disease mentioned previously, idiopathic steatorrhœa. Here there is a vitamin *D* deficiency; but it is useless to give the usual oily solution, since fats are so poorly absorbed in this disease. The problem is solved by the administration of calciferol in tablet form. Vitamin *E*, the anti-sterility substance, is different again, for, though fat-soluble also, it is really of the nature of an alcohol. It may be remarked that it is likely that lack of fertility in menageries and also among poorly nourished races in time of national hardship may be in part due to the deficiency of vitamin *E*. The other vitamins are of varied structure. Aneurin, or vitamin *B₁*, is not yet clearly identified, although its synthetic form is coming into fairly general use in the treatment of peripheral neuritis and similar conditions. Vitamin *C* is comparatively simple in structure, being ascorbic acid. One of the most interesting developments is the elaboration of a simple skin test to determine whether an optimum amount is being absorbed or utilized. It is quite a simple matter to estimate the amount of vitamin *C* in blood or urine; but now a simple method is available in which the chemical indicator is injected into the skin and the colour changes, due to circulatory ascorbic acid, are watched over a test period of time. This test may yet prove of definite clinical value. Before we leave the subject tribute must be paid to the labours and ingenuity of those who have not only identified these substances, but have made their synthesis possible. A great deal has been done in this field, and events are still moving with almost disconcerting speed.

The Endocrines.

Lastly we come to the glands of internal secretion, whose hormones or chemical guides of the body processes are largely concerned in making us the men and women we are.

Some of the most fascinating chemical research has been carried out on the thyroid secretion. Very early the large percentage of iodine in the thyroid was recognized, and later this was correlated to the iodine content of the soil. Then three substances were described: di-iodotyrosin, iodothyroglobulin and thyroxin. I mention these as the discovery of di-iodotyrosin is an example of one of the researches which seemed at first to be utterly dull and academic. This substance was first isolated from a flexible coral, the West Indian fan coral, which contains iodine in this form in its horny axial skeleton. The importance of its existence in the mammalian thyroid now has some contact with clinical medicine, as it is sometimes used instead of Lugol's solution in preparing hyperthyreoidic patients for operation. In 1914 Kendall discovered thyroxin, and twelve years later Harington's famous work established its formula and completed

its synthesis. It is now doubted if thyroxin is to be regarded as the measure of activity of the thyroid gland; the actual principle is believed to be much more complex.

Adrenaline is another substance which has been successfully synthesized after a brilliant research which established its chemical relations with tyrosin. It is most interesting to think over the similarities and chemical linkages between some of the most vital of chemical substances formed in our bodies; it adumbrates the discovery of some general laws which may unite the production of these compounds so different and so far-reaching in their varied effect to a common origin and purpose. The value of adrenaline in medicine needs no stressing. Persons are now alive who would have been dead but for the timely introduction of a few drops of an adrenaline solution of 1 in 1,000 into their circulation and perhaps into the heart itself.

The discovery of insulin is one of the most beneficent of modern times. It is interesting to look back to the first most ingenious but cumbersome method of preparation. The pancreatic duct of a dog was tied, the pancreas thus being caused to atrophy, excepting for its islet cells, which were proved to produce insulin. The insulin could be thus extracted from these cells without risk of destruction by the active pancreatic ferments. But once it was proved that insulin could be isolated the chemist dashed into the fray, and in a short space of time had devised a simple chemical method by which practically pure insulin could be cheaply produced.

Most interest today centres round the pituitary and sex glands. The pituitary, intimately related to the vegetative centres of the brain, is the king-pin of the endocrine system, and its hormones regulate the function of the other glands; but we have no time to consider these, for of greater chemical interest are the sex hormones, the story of whose relation to cholesterol and other sterols is one of the most fascinating chapters of medicine.

Perhaps it is straining a point if I say let no one laugh at fat, unwelcome though its obvious presence may be at times in the subcutaneous tissues. Cholesterol, though not a fat, is linked up with the fat metabolism of the body, being concerned with fat transport; it is present in bile (where it may in excess form gall-stones) and also in sebaceous material. It is curious, then, that from cholesterol chemists have now synthesized sex hormones. These hormones, which keep the race in perpetuity, are built up on the characteristic four-ring skeleton of the sterols, which with a long trailing side-chain makes up cholesterol, whose structural formula needs only minor alterations and additions, such as of methyl groups, to transform it into that of the male and female sex hormones. The remarkably close relationship of the male androsterone to the female oestrone brings up a question for answer. Why this close connexion? Why, for instance, should the urine of male animals contain the female hormone? Is the male hormone produced in both sexes, as some believe, and converted in

varying degrees to the female hormone, according to the sex of the individual and perhaps also on the species? Or is there some common substance from which either hormone may be formed? The successful synthesis of substances apparently identical with these hormones suggests great possibilities. Already these substances are of clinical value, though if simplification of methods leads to the output of patent synthetic substances which are at the same time cheap, their practical application will be much wider.

Certain other facts should be mentioned. It is known that certain carcinogenic substances, such as those derived from tar, which can produce cancerous growths in animals, have a definite oestrogenic capacity. This relation between reproduction of the species and the disordered growth of certain cells may not be fortuitous. Still more interesting is the recent observation that a derivative of stilbene, a simple hydrocarbon, has an oestrogenic capacity about three times that of oestrone itself, although apparently of different chemical constitution.

Conclusion.

Dimly we may perceive the beginnings of a chemical integration of the secrets of life, and imagination may even leap ahead and wonder if this knowledge may not perhaps be applied not to destroy the world, as today we are trying very hard to do, but to save it.

What is to be the future of medical chemistry? Certain lines of advance suggest themselves. The significance of the common elements in the body, and particularly in food, will be more clearly realized; the rarer metals perhaps may yet come into their own. The more intimate structure of proteins, fats *et cetera* will be more closely studied, and the relations of molecular arrangement to metabolism worked out. Further analytical investigation of body fluid and tissues will be made, with a corresponding enrichment of clinical medicine. New drugs will continue to be synthesized, and more active principles will be isolated. In the future the pharmacopœia will be more drastically and courageously revised; the bottle of medicine may practically disappear, and perhaps we shall deal with substances so concentrated and potent that the control and disappearance of quack nostrums may follow as a necessity. The problems of toxicity and idiosyncrasy will be studied closely, and with them the more fundamental question as yet not a quarter answered or understood, the action of drugs on the body processes in health and disease. I have mentioned Paracelsus: poseur and charlatan he was, but he had his visions, as Browning saw clearly when he made him say in his dramatic poem:

And I betake myself to study again
Till patient searchings after hidden lore
Half wring some bright truth from its prison.

This may well be our motto for the future. Our chemical knowledge in medicine will ever be partial only; for the temple of science is like a cathedral:

it is never finished. Never more than half the bright truth shall we see; but the doctor looks to the chemist for a good share of that fraction of truth. In many ways the chemist has the better part: he strives for greater and still greater accuracy, and continually reminds us that measurement is a necessary concomitant of knowledge. But the doctor will always have to deal with many variables. Personality, life in all its bearings, economic, romantic, familial and hereditary factors have all to be taken into account with each individual, and the doctor has to combine the methods of the scientist and the priest in variable proportions. The latter the chemist cannot give us; but the former we owe largely to him and his love of knowledge for its own sake.

SOME COMMON EYE INJURIES AND DISORDERS.¹

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BEFORE commencing this paper I wish to say that I fully realize the difficulties of the general practitioner in keeping in touch with eye conditions at all. Though this paper is entitled "Common Eye Injuries and Disorders", none of the subjects I am going to discuss are really common in the sense that you meet with them frequently. Many present themselves often enough in ophthalmic practice; but these are brought together from a very wide area, and what may be of weekly occurrence to one of us may happen to you once in several years.

Eye Injuries.

When the position arises in which you are asked what is the best course to adopt in an accident involving an eye, the decision you make may have a most important bearing on your patient's future vision; and as there are certain basic principles which apply to all injuries which have involved the eyeball or structures in and around the orbit, a general consideration of them can harm none of us. I have tried to include in this paper at any rate most of the injuries you may be called upon to see; in some of them the hope of future vision may hang by the merest thread. As it is the general practitioner who is called upon to see these patients first, his advice has a very real importance. It is quite impossible, of course, in a short paper to cover the whole field of eye injuries, nor is it possible to discuss any of them without mentioning facts well known to you all. My only hope is that from amongst what you will hear, something, however small, of interest or information will be forthcoming.

I have heard ophthalmology called an "elegant" specialty. The term is an apt one. Although we

¹ Read at a meeting of the South Australian Branch of the British Medical Association on April 28, 1938.

as ophthalmic surgeons are interested in our patients' general health, and frequently call upon you to tell us what a general examination discloses, we do not deal personally with the grosser functions of the human body; and though eye pathology may be linked up in a most important way with changes elsewhere, our field, when we are considering the eyes alone, is a small one. Changes from the normal which we call gross are relatively microscopical, and this leads me to the first point I wish to make: without some adequate means of examination no one can expect to make an accurate diagnosis of eye changes. I do think that the practitioner who gives advice and treatment in an ophthalmic case should equip himself with the simple tools which every ophthalmic surgeon uses as a matter of course; I mean a lens of 13 diopters and a small magnifying glass. By holding the former in the path of the rays from an ordinary frosted electric light bulb, focusing the light onto the various portions of the eye to be examined and looking at the illuminated spot through the magnifying glass, the practitioner will easily be able to see minute changes which escape the unaided eye. Everybody these days uses an ophthalmoscope; and if the focusing lenses are used to see the various structures in turn, from cornea to fundus, lesions which are outlined by the reflected light from the eye grounds are rendered visible. If the lenses are used in this way, foreign bodies, keratic precipitates, lens opacities and so on can all easily be made out. If the lenses are combined with the focal illumination previously mentioned, you can make quite an adequate ophthalmic examination. I know that such examinations require a little practice and skill; but I believe that without them it is very unwise to diagnose ophthalmic disorders, much less to treat them.

There are certain points which should not be overlooked when an injured eye is being dealt with. They apply to all injuries in and around the orbit, so they can be enumerated before I go on to describe any particular injury in detail.

A good history comes first. The first person to see the patient will probably get the most accurate account of an injury. It may be of great value in diagnosis and treatment, and also later in the courts when a claim for compensation is being made. Get as accurate an idea as you can of the vision in the uninjured and in the injured eye. The former has mainly a medico-legal bearing; the importance of the latter is too obvious to need stressing.

Make the examination under the best possible light, either with focal illumination such as I mentioned before, or with some sort of electric torch which throws a brilliant focused beam onto the part you wish to see. I may seem to be labouring this point; but it is simply amazing what you will not see if you omit to use more than a general inspection by daylight or ordinary electric light. Blood in the anterior chamber under certain conditions looks black. I have more than once seen a patient in whom this has occurred labelled as

having a widely dilated pupil. Illuminate the area properly, and no one can possibly confuse the two. Use an ophthalmoscope, and the mistake cannot be made. I give this as one instance only; there are, of course, hundreds of changes which may pass unnoticed if adequate care in examination is not used. Where there is a possibility that penetration of the globe has occurred, use the utmost gentleness in separating the lids. A very hopeless-looking eye, which has lost much vitreous, may make a quite unlooked-for recovery if treated gently; any pressure by the surgeon in trying to look, aided by the patient's squeezing, will express more vitreous and lessen the eye's chances. If great difficulty is experienced owing to swelling of the lids, or if the patient is refractory or is a young child, I prefer to make my examination under a general anaesthetic. Such tools as may be needed to deal with any ordinary emergency are prepared, so that no time is lost and a second anaesthetic is avoided.

Injuries to the Lids.

To go on to more particular description: the first injuries to consider are those in connexion with the lids. They can be passed over without much comment, since ordinary surgical principles apply; but it is important to bear in mind the fact that the action of the orbicularis muscle is to cause gaping of those wounds which lie at right angles to its fibres. For this reason any wound involving the lid margin should be most carefully sutured; and if operative interference is planned, such as the opening of an abscess, the line of incision should be concentric with the lids to produce the minimum of scar tissue. In conjunction with contused wounds of the lids (the ordinary "black eye"), a surgical emphysema, increased on nose-blowing, may be discovered; this always denotes a fracture communicating with accessory air cells. Fortunately it seems to recover spontaneously. It is always wise to consider the possibility of orbital fractures in any severe blow and to palpate the orbital margin. Ocular movements and vision should be tested and the eyes should be examined for possible exophthalmos, though these investigations may be made difficult by the presence of much lid swelling.

Conjunctival Injuries.

First among conjunctival injuries we might consider that very common injury, a foreign body in the conjunctival sac. In the lower lid it is easily seen, and is usually removed simply by lachrymation. In the upper lid eversion is, of course, necessary to find it, and if visible it is easily removed; but here I want to emphasize the point that the most minute body under the upper lid will cause just as distressing symptoms as a large one. I here find myself reverting to the text of this discourse by insisting that before you can assure a patient that nothing is under his lid you require a more adequate proof than a search with your unaided vision in ordinary daylight or electric light. Certainly a careful scrutiny under these conditions will reveal the greater proportion of foreign bodies;

but the tiny ones will be missed. If nothing can be seen after the most careful search, it is wise to wash the eye out thoroughly with the lid everted—an invisible piece may be got rid of in this way. I suppose I should not pass on without repeating the time-honoured warning that quite large objects may lie in the upper fornix and remain invisible if ordinary eversion is employed. The examiner should never stop short at this, but should doubly evert the lid till the fornix is exposed. I have spoken of this because I have removed two grass seeds in quite recent times from eyes which had been treated for monocular conjunctivitis for some time without much improvement. It is therefore a possibility worth keeping in mind, and a procedure which we may be apt to overlook.

Some people are very hard to handle and will not cooperate. If this type of patient is being examined for a possible foreign body, I suggest that you put a few drops of 2% "Decicain" solution in the eye before you start. It makes the examination quite painless and very much easier from both sides. While talking of foreign bodies, and especially of those which may be missed, I must add that one which I have found to be passed over quite often is the object like a lash or hair or piece of hay which lodges in the punctum. They cannot very well be missed if looked for, but they cause a great deal of discomfort until removed. The redness is usually limited to the inner canthus and conjunctiva immediately adjacent. Quite often it is possible to make a "spot" diagnosis by the obvious irritability of the eye and limitation of the objective signs. Much more serious are those cases in which the foreign substance consists of strong acids, alkalis or other noxious agents which have splashed into the patient's eyes. None of you, I take it, would be particularly anxious to keep the treatment of such patients in your own hands; but quite often you will be the first person to handle them. Unfortunately the damage has usually been done by the time skilled help arrives; but I believe that the most important thing is copious washing with ordinary tap water. Carried out thoroughly, this at least ensures that no further damage occurs; and though theoretically an attempt should be made to neutralize acids or alkalis by an opposite type of lotion, valuable time may be wasted in preparing it, and pure water is usually quickly obtainable. After a good douching, put in a drop of some oily preparation—liquid paraffin is as good as any. I do not think I can be accused of self-advertisement if I say that after this has been done it would be wise to hand the patient over to an ophthalmic surgeon. While on the subject of noxious agents, I may say that it is difficult to say in certain cases whether damage is likely to result from any given one or not. The number and variety which one meets with are extraordinary, and though in some cases, from the nature of the fluid, no serious damage might be expected, it is wise to be guarded at first, as the damage to corneal epithelium is not always immediately apparent. This is notoriously

so in caustic injuries, but may occur with other agents.

I saw a small boy who lost most of his corneal epithelium by making contact with a bottle of skin lotion. The first person to see him, I understand, made rather light of it. Certainly a complete cure resulted, but only after a rather stormy passage.

I quote this merely to support a suggestion that you play for safety by waiting to see if your patient's cornea is clear, not only immediately after the injury, but next day and on successive days.

Caustic burns are in my opinion the worst of all; the full extent of the damage is not apparent for days or even weeks afterwards.

In the worst case it has fallen to my lot to deal with, the patient lost her cornea altogether about the fourth day. It just dropped off. Although evisceration was completed surgically and everything possible was done to try to prevent it, the whole conjunctival sac gradually disappeared. The child has now a palpebral opening about four millimetres long. I saw her again since starting to write this paper, and the process now seems to be ended. I think some restoration of the socket will be possible, but it is a most unpromising looking lesion at present. In this case first aid was not forthcoming, and it was some hours after the injury before any treatment was given; this probably accounts for the extreme destruction.

Wounds of the conjunctiva, frequently enough seen, usually heal up quite rapidly and easily with simple treatment. They are usually accompanied by a good deal of subconjunctival haemorrhage, and look worse than they are. Their main importance lies in the necessity of making sure, by a careful examination of the fundus, that no more deep-seated lesion exists.

Corneal Injuries.

Before discussing injuries which involve damage to structures inside the globe, I should like to say a few words about lesions of the cornea, comprising those caused by foreign bodies either on the corneal surface or embedded in it, and damage to the structure consisting of a superficial abrasion or a deeper wound.

I suppose foreign bodies in the cornea are dealt with more frequently by the general practitioner than by the ophthalmic surgeon. Many do not come into skilled hands at all, but are taken off by the local expert in the works with the point of a pocket-knife. A good deal could be written about them. They can be very easy to remove, and extremely difficult. First of all, removal should never be attempted without a good local anaesthetic and a good light. The foreign body should be most clearly seen before an attempt to take it off is made. It is wise to wear some form of magnifying glasses; the so-called binocular loupe is what I find far the best. The instrument called a spud, which was devised for the purpose of removing corneal foreign bodies, is applicable, in my opinion, only when the object is lying loose in the surface of the cornea, and can be brushed away. A needle is infinitely better for any embedded particle, with the understanding that it is used under proper conditions. If the object is clearly seen it can be picked off the cornea with

the needle without anything else at all being touched; so the damage is minimized.

Many foreign bodies are metallic and are quite often present for some days before the patient comes for help. In these the central portion will lift off quite readily, but a brown ring of rust will be left behind. This should never be allowed to remain. It acts as an irritant, and recovery will be very much delayed. Its removal is not a particularly easy thing and requires a good deal of patience, but one would not feel satisfied till it had all disappeared.

After removal of a foreign body some judgement is required as to which patients will require further attention and which will not. If any of you have seen an acute infection supervene in any of these cases, with panophthalmitis and ultimate loss of the eye, it will have been brought home to you that due respect must be given to even the tiniest injury. The eye should be washed out before and after removal of the foreign body, asepsis of instruments should be maintained, and some antiseptic drops should be inserted, the eye being covered by a sterilized pad and bandage. The patient should be seen again next day.

With regard to the use of a mydriatic, I think that in all cases of injury by a foreign body which has involved more than mere epithelial destruction or cloudy infiltration of the cornea surrounding the wound, atropine should be instilled. The objection to this is, of course, that even if a mydriatic is put in only once a considerable time must elapse before the power of accommodation returns; and some work-days may be lost even when the eye heals up rapidly. I think that in those cases in which a quick recovery appears likely, a drop of 0.25% hyoscine solution may be used for the first twenty-four hours. If things are doubtful at the end of this time a change to atropine may be decided upon; but if the eye is quiet, the recovery from hyoscine is much quicker and the patient may be back at his work next day.

In those cases in which the signs of photophobia and lachrymation are pronounced, the cornea is infiltrated, and obvious infection has been conveyed with the foreign body, it is quite justifiable and wise to carbolize the spot from which the object is removed in the same way as any septic ulcer is carbolized. Never attempt to dig out a foreign body which is obviously deep-seated. Unless you are skilled in intraocular surgery, confine your treatment to foreign bodies you can lift off easily.

Injuries to the cornea which do not involve the presence of a foreign body may arise from a multitude of causes, and vary from an epithelial abrasion to a perforating wound. However, of the latter I wish to speak when discussing perforating wounds in general. It is to the more superficial injuries that I wish to draw your attention now.

No lesions which have damaged the cornea should be looked on as trivial. Organisms can invade the most minute scratch and produce a train of symptoms which may end in disaster. Therefore, when a patient presents himself to you with photo-

phobia, pain or discomfort, lachrymation and an injected eye with a small pupil, always make sure that the cornea is intact. We are told to do this by reflecting the light from a window over successive portions of the patient's cornea back to our own eye, and noting any irregularities of the surface. This is an excellent test of patience and powers of observation. A much simpler way is to put in a drop of fluorescein solution, leave it for a minute or two, wash it out again with some simple lotion, and look for bright green spots on the cornea where the epithelium is missing. I can assure you that I have seen dozens of abrasions missed by omission of this very simple test. I am always suspicious of a unilateral red eye being labelled as conjunctivitis; here at least is one method of examination which will lessen the number of cases in this category.

Superficial abrasions of the cornea heal, if clean, with amazing rapidity. Quite large areas will epithelialize in twenty-four hours. It is always wise to treat them with respect. After removal of a foreign body, wash out the eye, instil atropine, bandage the eye. See your patient again next day.

Unfortunately the infected corneal wound is not nearly so pleasant to deal with. Boxthorn, pen-knives, sharp rushes, barbed wire and many other similarly sharp and unpleasant objects occasionally injure the cornea. If the patient is seen early, expectant treatment can be used for twenty-four hours if the lesion is obviously superficial; but if any signs of infection are present and if the wound is at all deep, I think it wise to cauterize it early and prevent worse things happening. Carbolization is as good an all-round way of producing disinfection of a corneal wound as any. It is a valuable weapon in the treatment of corneal ulcers, as it does not involve materials or instruments which anybody is likely to lack. A pointed match stick makes a good applicator. The eye is anaesthetized with "Decicain", the lids are held open and the area is dried with a small pointed piece of blotting-paper. It is wise to wear a binocular loupe to make sure that the area is plainly seen; also it is a good plan to stain with fluorescein before starting. The pure carbolic acid should be confined as much as possible to the infected area; certainly it should not be allowed to touch the conjunctiva. However, a little reaching the surrounding clear cornea is of no great importance. Pack the eye with atropine ointment before bandaging.

The condition of corneal ulceration, which I intended to include later on when speaking of eye conditions apart from injury, is so bound up in what I have been saying that it might be advantageous to discuss it here.

Corneal Ulceration.

I have already pointed out what I consider the most important points in the diagnosis of corneal ulceration—fluorescein and focal illumination. The diagnosis is easy. The question of what constitutes the correct treatment is not so simple. It would be quite impossible to enumerate either all the varieties

of corneal ulcer met with or the treatment of each separately. There are two, however, fairly frequently seen, which you may come across; they are the dendritic ulcer and the small marginal ulcers associated with a Morax-Axenfeld infection. The former are a manifestation of *herpes cornea*. They may be the result of the true herpes virus, but also they may possibly be caused by the toxins of the pneumococcus or the influenza bacillus. A dendritic ulcer, so-called from its arborescent shape, spreads widely when untreated and may involve considerable damage to vision by subsequent scarring. My own experience is that they are easily aborted and healing is easily accomplished by carbolization. Unhappily, I have seen many cases in which the ulcer has been in evidence far too long without being recognized. Fluorescein would have pointed out the nature of the lesion much earlier and prevented much unnecessary loss of sight.

The Morax-Axenfeld bacillus is responsible for the so-called angular conjunctivitis. Quite often damage to corneal epithelium accompanies the conjunctivitis, and a fairly typical corneal ulceration occurs. The ulcers are marginal, and at first multiple and discrete, tend to coalesce and even to form segments of a circle. The main point of interest to us is that zinc sulphate clears up both the conjunctivitis and the ulceration. If the diagnosis is correctly made, relief is usually very quickly obtained.

I am often asked what makes it appear necessary to apply more active treatment than the usual drops, atropine and pad and bandage in a given case of corneal ulceration. There are several points which help the decision. First, all dendritic ulcers require more active treatment; secondly, if by repeated stainings it is obvious that an ulcer is spreading in size or is stationary, then more active treatment is needed; thirdly—a point I have mentioned before—*infiltration* of the cornea surrounding the ulcer indicates a need for stronger measures. Of course, when grosser changes, such as hypopyon, supervene, or when the ulcer has a definitely sloughing base and overhanging margin, it is obviously hopeless to ensure a good result without active treatment; by early diagnosis and treatment, however, excessive damage may possibly be prevented. Unfortunately there will always be individuals who let things go too far before seeking advice. My last and most glaring example of this was a child who was brought for the first time to a medical man with a fully developed panophthalmitis following an injury some days before. How any sane parent could allow such a thing to happen passes my comprehension.

There is a much-respected precept never to bandage a sticky eye, so that where corneal ulceration is complicated by much discharge, bandaging is contraindicated, with this exception, that in all cases in which the corneal epithelium is damaged a bandage should be applied and a mydriatic used till healing is complete.

Injuries of the Eye-ball with Blunt Instruments.

All of you must have been called at some time to the patient who has had a blow on the eye with a tennis ball or cricket ball or what not, and who has an effusion of blood in his anterior chamber. The patient and relatives are very worried and want to know whether the sight has been permanently damaged. Obviously the vision is much impaired at the time, quite often consisting of mere perception of light. I want to give you a word of warning about these cases: never give a good prognosis. If you give an optimistic one, cover yourself by saying that no one can tell till all the blood has cleared away. This is quite true, as the projection of light, by which one usually judges whether the retina is intact or not, is often hard to interpret in these cases, especially in the presence of a vitreous haemorrhage; and, of course, the fundus cannot be seen until the hyphaemia goes. One has only to consider the possible complications after an injury of the eyeball due to direct violence to realize that the patient is going to be lucky if he escapes with none of them. After all, a blow sufficient to produce a hyphaemia must be fairly severe and directly applied to the eyeball itself, which, with its very delicately balanced intra-ocular anatomy and highly vascular and vulnerable structure, is very prone to damage which may permanently impair its functions. G. H. Cross, in Behrens's "The Eye and its Diseases", gives a list of twenty important changes which may follow contusion of the eyeball. The list is taken from Roeme's "Text-Book of Ophthalmology". I do not propose to burden you with a list of all twenty, but some of the common and most important are: (i) iridodialysis, (ii) traumatic mydriasis and miosis, (iii) laceration of the sphincter, (iv) paralysis and spasm of accommodation, (v) cataract, (vi) luxation and subluxation of the lens, (vii) haemorrhage into the vitreous, (viii) *commotio retinae*, (ix) detachment of the retina, and (x) choroidal rupture.

In addition, there is the case in which the primary haemorrhage is followed by successive spontaneous haemorrhages, which may lead to considerably more damage than was expected at first. When the eye is apparently improving, the patient experiences a sudden pain; the anterior chamber is found to be packed with blood and the tension is high. I do not feel that this paper calls for a discussion of the treatment of this particular condition nor possibly of the others; but it should be remembered that they exist and support my contention that it is better to give a very guarded prognosis when dealing with an eye which has received a direct blow.

As regards immediate treatment, cold applications and complete rest seem the most sensible. There is a certain amount of difference of opinion about the use of atropine. Some oculists consider that it may tend to increase the incidence of spontaneous or secondary haemorrhage which I mentioned. At all events there can be no great advantage in using it, so that possibly it is wise to omit it. It is wise

to make a practice always to admit to hospital persons with injuries associated with hyphaemia. Of course, one sees plenty of injuries, especially in children, in which the hyphaemia goes away in a few hours; and next day the eye is practically quiet and goes on to make a complete recovery. So far we have considered injuries in which damage is evident from the presence of hyphaemia. Considerable deterioration of sight can follow injuries in which, though the eye has been struck, no hyphaemia is present. In these cases the visual acuity can be estimated and the fundus examined. It is essential that neither of these investigations be omitted.

I remember a few years ago seeing a small boy who had been playing cricket and had been struck by a rising ball in the left eye. No external evidence of injury was present. He had not at first complained of any disturbance of vision, and the fact that his vision was affected at all had been entirely missed for three or four days. A fundus examination revealed a rupture of the choroid between disk and macula. His central vision was nil.

Now it is quite evident that treatment could not possibly have altered the outlook in this case. The parents were assured that this was so and, I think, believed it; but it is never wise to allow the passage of time to make a diagnosis which could have been established on the spot. Many people will take the stand that something could have been done at the time if only the trouble had been noticed, and they can be very hard to convince.

Perforating Wounds of the Eye.

Perforating wounds of the eye comprise a subject on which volumes have been written. I do not propose to do more than try to describe a few of the pitfalls you may encounter when dealing with them. They may vary from a prick from some minute sharp object, such as a needle, to a gross destruction from a large missile which has struck the eye. If the object is very small and has punctured the eye and come out again, the whole question of prognosis depends on infection or the absence of it, and whether the lens has been damaged. In those cases in which the eye has been injured by a sharp object, nearly always by the time you see the eye, even if the cornea has been punctured, the anterior chamber will have filled up again. If there is any doubt as to whether the wound was penetrating or not, have a good look at the lens both by reflected and by transmitted light. The lens fibres round the punctured capsule soon become opaque and visible as a small greyish opacity. This opacity in rare instances grows no larger, but quite often the whole lens becomes cataractous.

As an illustration of how simply such an accident may occur, I shall tell you of a case I saw with Dr. Brook Lewis some years ago, in which a girl had stuck a needle in her dress. As she moved her hand she brushed against it, and the recoil was sufficient to make it fly upwards and pierce her cornea and lens. A traumatic cataract developed, which was absorbed completely without any further surgical interference than her self-inflicted operation.

While on the subject of small penetrating wounds I must remind you that flying metallic particles

may perforate the eye without causing much inconvenience to the patient. Two common histories are that the patient was either chopping wood or hitting something with a cold chisel when he felt something strike his eye. He did not think very much about it, but he comes along to see if his eye is all right. Sometimes nothing much can be seen, but the presence of a tiny corneal wound, a hole in the iris or a hole in the lens capsule gives the diagnosis. I mention these conditions, which I suppose cannot be called common because they crop up not infrequently in an eye practice. An X ray film will nearly always settle the doubt, and the best time to deal with them is early. I mentioned wood-chopping as a cause, since, although one sees plenty of blows caused by the wood flying up, it is the case in which a tiny fragment of the ax edge has entered the eye which may pass undiagnosed till failing vision, *siderosis bulbi* and lens changes make the position clear. Wood-chopping in itself must provide a very large percentage of eye injuries. I have seen, I think, every imaginable type of complication from this apparently innocent occupation.

With regard to larger perforating wounds, I do not presume that you are going to treat them yourselves. There is, however, one aspect on which you may have to make a decision, and that is when these injuries are complicated, as is so commonly the case, by prolapse of the iris. The only treatment for this is efficient and early excision of the prolapsed iris. If you do not wish to perform this yourself, try to get your patient as early as possible to wherever he is going to be treated. I say this because, apparently, the urgent need for treatment in these cases is not sufficiently well recognized, and quite commonly it is my lot to get these patients, especially in hospital practice, after many valuable hours have been lost. The whole aim and object of surgical intervention in these cases is to ensure that no uveal tissue is left entangled in the wound. In satisfactory cases the iris is gently freed and pulled out a little further from the wound, so that when it is cut the edges retract away from the wound area. When left alone, the iris outside is cut off from its blood supply by being nipped in the wound. It may slough off, so that the operation becomes impossible, while in addition the danger of sepsis is much increased. One curious thing is that penetrating wounds of the cornea, with prolapse of the iris, do not seem to cause a great deal of pain, especially in children.

A child of about three years of age was brought to the out-patient department with a history that a small black speck had entered the eye three days previously. The parents waited to see if it would fall off, and as it did not they sought advice. The small lump was a knuckle of iris protruding through a corneal wound, and yet the child complained of nothing and kept his eye well open, and no history of injury was available.

It is surprising what repair can be accomplished in even gross wounds, especially if the wound is confined to cornea or sclerota. Vitreous loss, of course, is a serious complication, but by no means

a fatal one to the eye. If the eye is bandaged and left alone, it is amazing what hopeless-looking injuries end in a more or less useful eye. The bugbear of all penetrating injuries is the possibility of a sympathetic involvement of the other eye. I believe, however, that one is perfectly safe for at least the first fortnight after injury, so that there is no need for an immediate decision about excision. Wounds in which damage to the lens has occurred are much less likely to heal satisfactorily than those in which the lens capsule has not been opened.

Recommendations.

My main recommendations concerning attention to eye injuries in general are therefore as follows:

1. Make an adequate examination in a good light.
2. Test the vision whenever possible.
3. Handle the eye gently.
4. Give a guarded prognosis where the eye has been struck, especially where a hyphaemia has formed.
5. Never miss an abrasion by failing to stain the cornea with fluorescein.
6. If any doubt at all exists as to the presence of an intraocular foreign body, make sure that all steps have been taken to eliminate the possibility.
7. If a penetrating wound is present, handle the eye as little as possible; bandage it and get the patient into expert hands as soon as you can. These patients are always best treated in hospital.

Diseases of the Eye.

I have not followed any set order in discussing common eye diseases; but I have mainly set down some remarks about the conditions which have come to my mind and appear to me most likely to be those in which your opinion will be asked.

Infantile Diseases.

First of all, in infancy there are two things which call for attention: they are acute infection of the conjunctiva in the new-born and persistent epiphora from one or both eyes, beginning at the age of a month or so and continuing without improvement. As regards the first, prevention is the important thing. This is carried out systematically in large maternity homes, but may be passed over in private houses or small private hospitals. Every year at the Adelaide Children's Hospital we have to deal with a dozen or so cases of *ophthalmia neonatorum* of gonococcal origin. Most of the babies recover. Occasionally a patient is left so damaged that useful vision cannot be expected. Often the infants are born without any suspicion having arisen that maternal infection exists.

I mention this here because it may be in your hands to prevent blindness by early prophylactic treatment, which, to be effective, should be applied to every baby you attend, not merely to the ones born in suspicious circumstances. The full method might be worth describing. Immediately the child is born the eyelids should be gently wiped with a pledge of cotton wool soaked in a 1 in 8,000 solu-

tion of perchloride of mercury. The child is then washed, care being taken that no water is allowed to reach its eyes. The final step is the instillation of a drop of 2% silver nitrate solution into each eye. The lids should be everted by being pulled apart, and the drop should be allowed to fall on the exposed conjunctiva. This is a time-honoured method, but I know of no better. Probably it is as well known to you as to me. I do think, however, that a series of unaffected babies may breed a sense of security, and the need for care is forgotten until it is brought home by the unexpected occurrence of a purulent ophthalmia. These cases are unpleasant to deal with. I have decided, after trying various methods, that over-treatment is worse than under-treatment. At present I am using cold boracic or saline lotion, not too frequently, and 4% mercurio-chrome drops. I firmly believe that our results have been the best under this régime.

To pass on to the question of epiphora in infants, only a little need be said about it; but that little is important. A baby's eyes will not water at birth because no tears are secreted, so that the condition of lachrymation will not appear till the child is a few weeks old. If, however, it is noticed by this time that a persistent watering, often accompanied by some discharge, is occurring, do not waste time treating the eye with drops. Pressure over the sac may be effective, and should be tried; but if this fails, and if the watering goes on, the child should be operated on forthwith. Syringing or probing should be carried out, so that the congenital block at the lower end of the nasolachrymal duct may be destroyed and normal drainage be established. I know that waiting is recommended by some. I can never see the use of it, since one small manipulation, which in expert hands is entirely free from danger, will in the majority of cases cure the condition in forty-eight hours. Only occasionally does the manipulation have to be repeated. The longer this is delayed, the more abnormal does the lachrymal sac become and the less likely is the success of the probing.

Trachoma.

The next disease that crosses my mind is trachoma. I know that many of you never encounter a case of trachoma at all. However, it is still a prevalent eye disease in South Australia, and one of the most crippling in its train of complications and sequelæ. Also it is becoming more common in the city. Years ago it used to be thought that no cases of trachoma occurred outside the northern districts. I have directly or indirectly at the present moment under my care six children with trachoma who have never been outside Adelaide. In each case evidence of contact with a probable source was found, so that I mention the condition here as an entity worth keeping in mind in examining any child brought to you with sore eyes. It is not possible to go into an account of differential diagnosis here. To think of the disease will be sufficient to make you diagnose or suspect it where it is present. Often in the

country children with trachoma are treated by their own family doctor. I should like here to pass on and acknowledge the usefulness of a form of treatment recommended by Dr. E. L. Gault, of Melbourne. It is not a new treatment, as he began to use it in 1894, but I personally had not seen it described until this year. As in most other forms of efficient treatment, the preliminary step is expression of the follicles. He follows this by painting with a 4% solution of perchloride of mercury in glycerine three times a week. I can assure you that, though possibly my patients have not been treated for quite long enough to ensure permanency of the results, it appears the most efficient treatment I have yet seen. The effect on one child, who was not doing well on other remedies, was so dramatic that after two months of treatment you could hardly believe his eyes were the same pair.

Squint.

Many people find difficulty in deciding whether a child has a squint or not. All babies squint at times. The interesting process of breaking wind either way seems to need an amount of concentration which is helped by converging the eyes. These attacks are over very quickly. However, babies will be brought to you in whom the act of squinting has become constant or the parents think it has, and you are asked to confirm or dispel their fears. I think this is best done by shining or reflecting a light into the patient's eyes and watching the reflex from the cornea. If it comes back to you from the same relative position in each eye there is no squint. It is wise also to slip a hand in front of one eye and observe on taking it away if the eye has assumed a deviated position and has afterwards returned to looking straight. This will disclose the child with occasional squint whose binocular vision has not yet broken down, but who still needs the same attention and care. The differential diagnosis in these cases consists almost entirely in eliminating those patients who have wide epicanthal folds and by an optical illusion look as if they squint, particularly when they are looking to one side. The reason for this is obvious; for the cornea of the eye away from the side looked to reaches the inner canthus before that of the other eye reaches the outer canthus, an illusion of convergence being produced. Parents of children with this condition are remarkably hard to convince that no squint exists. However, if you can be certain that your light reflex comes off the centre of each cornea simultaneously and no convergence is elicited by occlusion, you can but try to reassure them. As the face develops, the epicanthal folds are used up in covering the developing nasal bridge, and by the time the child is two or three years old the appearance is normal. In slightly older children the main principle of examination holds good; by this time one eye may have become amblyopic, the child fixes constantly with one eye and turns the other. Nearly always, when this happens, the baby tolerates the covering of one eye (the amblyopic one) while

being shown some bright object, but objects strenuously and pulls away his head when the good eye is put out of action. An older child can be asked to look at the examiner's finger or a pencil, while the eyes are covered in turn and the position of the covered eye is observed after a brief pause. The alternating squinter will continue to fix with the uncovered eye, whichever side is tested. The unilateral squint will always go back to the better eye. This is tedious to explain and very simple to put into practice. I do think, however, that it is worth doing. First of all, it is very important not to miss a squint, and secondly, it is very awkward for everyone when a child is referred for treatment of a squint which does not exist. Fortunately I do not feel called upon to discuss the method of treatment with you; one thing, however, I do beg, and that is that you will refer all patients, of whatever age, in whom the condition exists, for examination and treatment as soon as the diagnosis is made. There are still—I shudder to say it—members of the medical profession who tell parents to "wait and see if the child will grow out of it". By the same token, why not wait to see if a baby will grow out of a talipes or a hare-lip? The time for treatment is immediately the diagnosis is made; and if this is doubtful, make sure by having the suspect examined and refraction tests made under atropine. Cosmetically, perhaps, this aspect being what the world judges by, a squinting child's eye can be put straight later on, and no one will be much the wiser; but it is at the expense of binocular vision that the waiting is done, and the lack of fusion is an enormous handicap to an individual in this strenuous and mechanical age. The restoration of function is what we aim at nowadays.

Most of you have heard of orthoptic training. I think perhaps a few words about it will not be out of place here. Your opinion may be asked upon the use of it by hesitant parents. There are still ophthalmic surgeons who decry it. In fact, I know of several who abuse it. My own experience is that it is of very great value; and if it is properly used in conjunction with judicious operating, I do not hesitate to say that it has changed the whole outlook in the treatment of squint from one of working for mere appearances to one of combining the latter with the restoration of true binocular function. Orthoptic training is helped enormously by the early handling of cases; so once more, at the risk of seeming too importunate, I ask you to hand over your squinters to an oculist when they are first discovered.

Conjunctivitis.

With regard to conjunctivitis in general, there are one or two things that may be worth saying. I cannot hope to discuss the diagnosis of it in full. All this is set down far better than I can put it in any well-known text-book you like to name. I assume that the diagnosis is made; this being so, the question of what form of treatment gives the best results arises. I have noticed that

the majority of practitioners use 5% strength "Argyrol" drops. Cyril Walker, of Bristol, is known to have said that the main value of "Argyrol" is that it is so dirty that the patient cures his conjunctivitis by his efforts to wash it away. I would not go quite so far as that; but it has always been a mystery to me why this should be so popular a drug with the general practitioner. Its value, in my opinion, lies in its being used in a great deal stronger solution, up to 30% or more, when like silver nitrate it could be used in painting the lids. Admittedly local applications in eye work are limited in number and usefulness, and if I were asked to name the best "all-rounder" for treating muco-purulent conjunctivitis, I would give the following prescription: 0.26 grammes (four grains) of zinc sulphate and concentrated boric acid lotion to 30 cubic centimetres (one ounce). It should be used frequently with an equal quantity of warm water. In the form of drops there are the following: 1% to 4% "Mercurochrome" solution; "Metaphen", 1 in 3,000. Also useful are drops which contain zinc sulphate, adrenaline and chloretoe; but in most purulent eye infections the mechanical effect of bathing is the important part. For this, saline or sodium bicarbonate solution is quite as good as anything. Boracic acid is, of course, the popular choice, and quite a harmless one. I have noticed, however, that some people develop a passion for eye-bathing, and as a result produce a chronic irritation of the conjunctiva. Boracic is the most likely offender in this direction; and sometimes in a boracic addict stopping the treatment is enough to make the eye better. It is difficult for some people to realize that Nature provides a most complete and beautiful little shower bath for the eye, with the most adequate solution for the purpose.

To go back to "Argyrol" for a moment, I do wish to utter a warning to those people who seem to have entirely forgotten that such a condition as argyrosis exists. I have seen within the last year at least three cases of it; the patients had been ordered "Argyrol" drops without the warning not to go on with them too long. Now I do not know exactly how long one can use a silver preparation with safety, but I should not think it wise to continue beyond two months.

Incidentally, one of these patients had been using the drops for eighteen months for a chronically infected lachrymal sac, which would never give her any peace till it was removed. She had the most beautiful black eye.

It puts the poor oculist, who wishes to live at peace with his fellow men, into a tight corner when the patient asks the reason for the discolouration. While I am on the subject of argyrosis, it might be interesting to mention that a similar condition may be produced by the use of mercury over very long periods.

I have recently encountered two cases, in one of which the condition was very pronounced. In this case 1% yellow oxide solution had been used for blepharitis over a period of many years; the staining was produced in the skin of the lower lid and was quite disfiguring.

This, however, must be a very rare condition. A condition often enough met with, and often mistaken for conjunctivitis, is the chronically infected lachrymal sac. Epiphora is nearly always present in addition to discharge, and pressure over the sac will often confirm the diagnosis by the regurgitation of some mucopus from the punctum. It is not so easily cured in adults as it is in babies. Probing is of very doubtful value, and usually to give the patient relief the sac has to be excised. This is followed by remarkably little watering and no discharge when the sac has been removed in its entirety. The time-honoured warning never to diagnose monocular conjunctivitis without eliminating every other possible cause of trouble should be repeated here. After all, the main diagnostic point in conjunctivitis is the presence of discharge and sticking of the lashes; if this is combined with conjunctival infection and no other signs, and is present in both eyes, the diagnosis is certain. If these signs are present in one eye the condition may be a true unilateral conjunctivitis; but it becomes important to eliminate the possibilities of lachrymal disease, or, as I have said before, the presence of foreign bodies.

Conclusion.

I had hoped to go on to say something of acute intraocular conditions, such as glaucoma and iritis, but I have spoken too long already. The differential diagnosis between the two would take much too long to discuss and would require a separate paper to do it justice.

May I finish with a plea that, if you are eventually going to hand your patient over to an eye surgeon, you do so without making a diagnosis rather than making a wrong one. The man who eventually treats your patient will bless you for making the way easy for him. I have never known the patient to resent it.

THE BLOOD SUPPLY OF THE VISUAL PATHWAYS.

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Introduction.

As far as can be ascertained no completely accurate account of the blood supply to the optic system in the brain has ever been published. For this reason, and also because improved methods of diagnosis have quickened interest in cerebral angiography in general, an exact description of the total supply to this single system may be considered opportune. In addition, as will appear, this survey lends itself to the formulation of a principle which may be of value in cerebral arterial disease generally.

Material and Method.

The material includes that employed for a previous paper,⁽¹⁾ with the addition of a further

brain dissected to clear up some of the more obscure points. The method, as before, comprised direct dissection of the vessels, with or without previous injection, by the aid of a binocular microscope.

Description.

The Optic Nerve and Retina.

As is well known, the optic nerve and retina are supplied by the central artery of the retina. This vessel enters the nerve at its lower inner aspect (Wolff⁽²⁾), not, as is generally believed, at its lower outer aspect, and runs forwards to the interior of the globe. Just after its entry into the nerve the artery gives off a recurrent branch which extends posteriorly as far as the optic foramen. The central artery and its recurrent branch give twigs for the supply of the interior of the nerve (Wolff), but it is possible that the outer part of the nerve is supplied independently from neighbouring channels (Traquair⁽³⁾). Within the globe the central artery supplies the retina to the level of the outer molecular layer. The layer of rods and cones is nourished from the chorio-capillaris.

The Optic Chiasma.

The optic chiasma is invested by an anastomotic arterial network in the surrounding *pia mater*. To this network come contributions from no less than eleven arteries: internal carotid, posterior communicating, anterior chorio-ideal, middle cerebral and anterior cerebral of both sides, and anterior communicating (Figure I). There is considerable reciprocal variation between these vessels, but in general it may be said that the internal carotid is related mainly to the posterior and inferior aspects, the middle cerebral to the lateral aspect, and the anterior cerebral to the anterior and superior aspects.

The Optic Tract.

The anterior one-third of the optic tract is supplied through an extension of the pial anastomosis from the chiasma, the arteries involved being the internal carotid, posterior communicating, anterior chorio-ideal and middle cerebral (Figure I). The posterior two-thirds of the tract is supplied chiefly from the anterior chorio-ideal artery, there are also contributions from the posterior communicating and posterior cerebral vessels (Figures I and II). Generally several branches from the anterior chorio-ideal artery can be observed to reach the tract but the largest of these pass completely through (Figures I, II and V) to enter the base of the brain.⁽¹⁾ The perforating arteries give small twigs to the tract, while the rest of the supply to this comes from the surrounding pial network. There is considerable mutual interchange between the anterior chorio-ideal and posterior communicating arteries, and occasionally one or other predominates to the almost complete exclusion of its fellow. Rarely either of these vessels may usurp the

stem of the posterior cerebral artery, which then arises from the internal carotid, and takes over the whole of the supply to the posterior cerebral field.

The Lateral Geniculate Body.

That some of the supply to the lateral geniculate body comes from the anterior chorio-ideal artery was first postulated by von Monakow.⁽⁴⁾ The total supply has been fully considered elsewhere.⁽⁵⁾ Here it is sufficient to state that when the main mass of the anterior chorio-ideal artery is swept laterally into the chorio-ideal plexus in the inferior horn of the lateral ventricle several twigs are given off to proceed posteriorly over the lateral geniculate body (Figure II), there to enter into a rich anastomosis with branches from the posterior cerebral and posterior chorio-ideal arteries. Analysis of the various contributions indicates that the anterior chorio-ideal artery supplies chiefly the antero-lateral aspect, the posterior cerebral branches chiefly the postero-medial aspect of the geniculate body. The intervening region, which corresponds to the hilum of the nucleus, is nourished through a rich anastomosis from both sources (Figures II and III). Within the nucleus it has been shown⁽⁵⁾ that the terminal twigs from the penetrating vessels end chiefly in the individual cell laminae; some pass beyond into the commencement of the optic radiation.

The Optic Radiation.

Beyond the lateral geniculate body the radiation passes laterally over the roof of the inferior horn of the lateral ventricle and through the retro-lenticular part of the internal capsule (Figures I and V). It then turns posteriorly, sweeping back around the descending horn of the ventricle, and spreads out to end in the striate cortex. The blood supply falls into three parts: while the radiation is passing laterally it is supplied by perforating branches from the anterior chorio-ideal artery; in its posterior course—lateral to the descending horn of the ventricle—it is supplied by the deep optic branch of the middle cerebral artery, which enters the brain through the anterior perforated substance with the lateral striate arteries;⁽¹⁾ and as it spreads out to reach the striate cortex it is supplied by perforating cortical vessels, mainly from the calcarine artery, but also from the middle cerebral artery. It is said that of these perforating vessels those which supply the radiation are independent of those which supply the cortex.

The Striate Cortex.

The visual cortex is restricted to the gyri immediately related to the calcarine sulcus. Anteriorly it reaches the parieto-occipital sulcus, above and below its limits are indicated by the poorly defined superior and inferior limiting sulci of Elliot Smith,⁽⁶⁾ while posteriorly it extends around the occipital pole to the lateral surface of the hemisphere for a varying extent (Figure IV). Occasionally the lateral limit is indicated by a

definitive lunate sulcus; but in the European brain, more often than not, little or no trace of this sulcus remains, and the lateral extent of the striate area can be determined only by examination of the cortical structure.

The calcarine branch of the posterior cerebral artery takes by far the greatest part in the supply to the visual cortex. It usually arises in common with the parieto-occipital artery and runs posteriorly in the depths of the calcarine sulcus. Then it turns around the occipital pole, in the posterior calcarine sulcus if one is present, to reach the lateral surface of the hemisphere (Figure IV). Arterial twigs emerge between the lips of the sulcus and extend above and below to the limits of the striate area. On the lateral surface of the hemisphere the calcarine artery supplies all the striate cortex except the peripheral fringe where the supply is taken over by small anastomosing twigs from the middle cerebral artery. The description of the arterial supply to this area is based chiefly upon the work of Shellshear⁽⁷⁾ and Rubino.⁽⁸⁾

The Lower Centres.

The roof of the mid-brain is supplied from a network of branches from the posterior cerebral and superior cerebellar arteries; but the former vessel provides the main supply to the superior *corpora quadrigemina* (Figures I and V).

According to Alezais and D'Astros,⁽⁹⁾ the oculomotor and trochlear nuclei are supplied by specific end-arteries which arise from the posterior cerebral artery and enter the mid-brain through the posterior perforated substance (Figures I, II and V). Stopford,⁽¹⁰⁾ however, states that these nuclei are supplied from the basilar artery. Dissections performed here support the opinion of Alezais and D'Astros; but it is quite possible that both descriptions hold for different brains.

In the great majority of cases the abducens nucleus is supplied through median pontine branches of the basilar artery (Stopford), but occasionally (Shellshear⁽¹¹⁾) the field of the anterior spinal artery extends upwards to supply at least part of this nucleus. Dissection suggests that, as in the case of the oculomotor and trochlear nuclei, each abducens nucleus is supplied by a specific end-artery.

Discussion.

For obvious reasons discussion of vascular lesions must be restricted to those of an obstructive nature, which alone permit any reasonable accuracy in diagnosis.

Obstruction of the central artery of the retina produces blindness; but consideration of this is beyond the scope of this paper.

The blood supply to the chiasma is so rich that it is difficult to conceive how obstruction of any individual vessel other than the internal carotid could produce serious interference with vision. The optic tract is also supplied from several sources, and disorder of vision resulting from obstruction of

one of its vessels does not appear to have been described. Henschen⁽¹²⁾ illustrates some cases in which vascular occlusion produced areas of softening of the tract; but the foci are few and small, and there does not appear to have been any visual disturbance.

In the lateral geniculate body matters are quite otherwise, and the nature of the visual defect may serve to indicate the vessel involved. The lateral aspect of the nucleus is related to the inferior homonymous quadrants, the medial aspect to the superior homonymous quadrants, of the retinae, and the intervening region, which radiates dorsally from the hilum, is concerned with the corresponding macular fields (Brouwer and Zeeman⁽¹³⁾). Le Gros Clark and Penman⁽¹⁴⁾ would restrict the macular projection area to the posterior two-thirds of the intermediate segment. The lateral and medial portions have separate individual supplies from the anterior choroidal and posterior cerebral arteries respectively, the intermediate segment above the hilum has a double supply, being fed from both sources (Figure III). Obstruction of the anterior choroidal artery produces degeneration of the lateral aspect of the geniculate body (Abbie,⁽⁵⁾ Mackenzie, Meighan and Pollock⁽¹⁵⁾), with resultant homonymous superior quadrantic hemianopia towards the opposite side, but with sparing of macular vision. This macular sparing probably depends upon the double blood supply to the hilar region. Apart from the possibility of isolated obstruction of the posterior choroidal arteries, in a block in the posterior cerebral artery any affection of the lateral geniculate body should be overshadowed by the much greater visual loss resulting from cortical interference. (Recently there has come to my notice a case of inferior homonymous quadrantic hemianopia.)

There is said to be some localization within the optic radiation, especially in the reported segregation of fibres from the lateral aspect of the lateral geniculate body in the so-called "temporal loop" of Meyer. The existence of this loop is, however, still a matter of dispute (Traquair). The supply to the optic radiation comes chiefly from the anterior choroidal and deep optic arteries, each in its own field supplying the whole thickness of fibres—and this holds even if the existence of Meyer's loop is sustained. Strangely enough, visual disturbance referable to occlusion of either of these vessels is not described. In apparently complete obstruction of the anterior choroidal artery the resultant superior homonymous quadrantic hemianopia towards the opposite side is clearly related only to obvious degeneration in the lateral part of the lateral geniculate body.⁽⁶⁾⁽¹⁵⁾ Destructive haemorrhagic lesions may produce permanent homonymous hemianopia towards the opposite side; but obstructive vascular disease appears to entail at most a transient visual disturbance.

Investigations by Holmes and Lister,⁽¹⁶⁾ Brouwer,⁽¹⁷⁾ Poljak⁽¹⁸⁾ and others have established localization within the striate cortex upon a firm

basis. Briefly, the superior homonymous quadrants of the eyes are projected above the calcarine sulcus (or its extension), the inferior homonymous quadrants below it. Moreover, monocular peripheral vision is projected in a narrow band across the anterior end of the calcarine sulcus, binocular peripheral vision in a broader band behind; and more posteriorly still, extending on to the lateral surface and involving the whole of the remainder of the striate cortex, is projected macular vision.

Obstruction of the posterior cerebral artery, or of its calcarine branch, produces profound interference with vision, as manifested by homonymous hemianopia towards the opposite side. The macular sparing which usually, if not always, accompanies the defect, probably depends upon the peripheral supply from the middle cerebral artery. According to Traquair,⁽²⁾ occlusion of the smaller branches of the calcarine artery may produce scotomata of various types.

In general it may be said that in obstructive vascular disease of the visual pathways interference with cell centres—retina, lateral geniculate body and visual cortex—produces gross and permanent visual defect, whereas interference with the intervening fibre pathways—optic tract and optic radiation—appears to entail little or no defect. In other words, nerve cells are much more susceptible to interference with nutrition than are nerve fibres. To what extent this principle is applicable to other cerebral systems is unknown.

Summary.

1. The blood supply to the visual pathways, including the lower centres, has been described.

2. There is some consideration of the effects of obstructive vascular disease upon the main pathways.

3. It appears that in such disease the heaviest damage is done when cell centres are involved, the least when fibre tracts only are concerned.

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THE PROBABLE VECTOR OF ENDEMIC TYPHUS IN NEW GUINEA.

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I. That the Vector is a Larval Mite (Acarina: Trombididae).

ENDEMIC TYPHUS was identified in New Britain in 1930 by Sinclair,⁽¹⁾ and on the mainland of New Guinea in 1934 by McKenna, who pointed out that the local type of the disease resembled *tsutsugamushi* fever. This resemblance has since been proved clinically by von der Borch,⁽²⁾ and clinically and serologically by the writer.⁽³⁾⁽⁴⁾ Investigation has proved that the disease belongs to type XK of the typhus group of fevers as classified by Felix;⁽⁵⁾ it agrees with the other members of this type in clinical features and agglutination reactions. Therefore, since the other members of the XK type and none of the other types have larval mites as vectors, it is reasonable to assume that the local vector is a larval mite also. There is ample circumstantial evidence in favour of this assumption, and none against it.

Larval mites are abundant in New Guinea, where they go by the pidgin name of *bush mokka*, and few whites who get off the beaten track escape the irritation of "mokka bites"; natives too occasionally complain of their attacks.

The *bush mokka* is distinctly regional in its habitat. In general, the *kunai* hills (switchback country covered with *kunai* grass and kangaroo grass) are practically free, although the scrub along the watercourses among these hills is fairly heavily infested. The bush is patchy; areas of dense, damp jungle in the river basins and smaller valleys are very heavily infested; sago palm (*sak sak*) and water bamboo (*pit pit*) swamps are reputed to be the most heavily infested spots of all; but the drier, less dense bush on the mountain slopes seems often to be quite free.

The mites are picked up by man as he brushes against vegetation; it is also simply asking for trouble to sit on a log or stump in infested areas. They prefer the parts of the body where clothing exerts pressure: around the waistline; beneath the stocking, especially on the dorsum of the foot and

ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

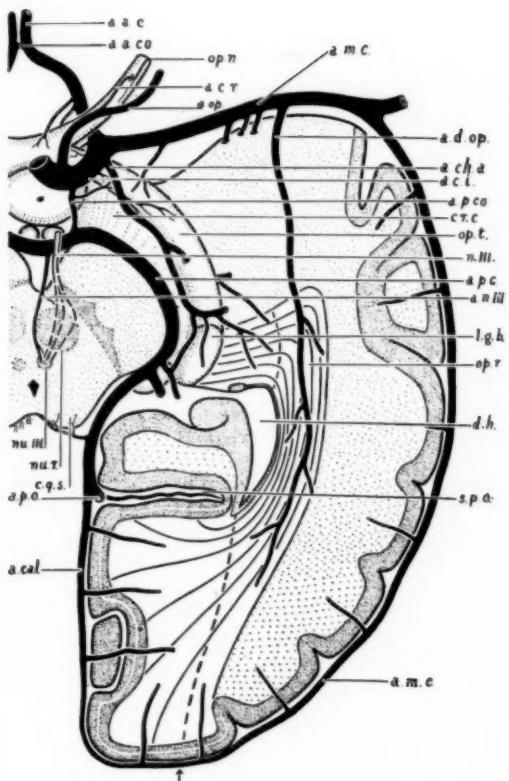


FIGURE I.

Total blood supply to the visual pathways, viewed from the ventral aspect: semi-schematic. Note the different sources of supply to the optic radiation. The arrow at the bottom of the figure marks the point of anastomosis between the calcarine and middle cerebral arteries.

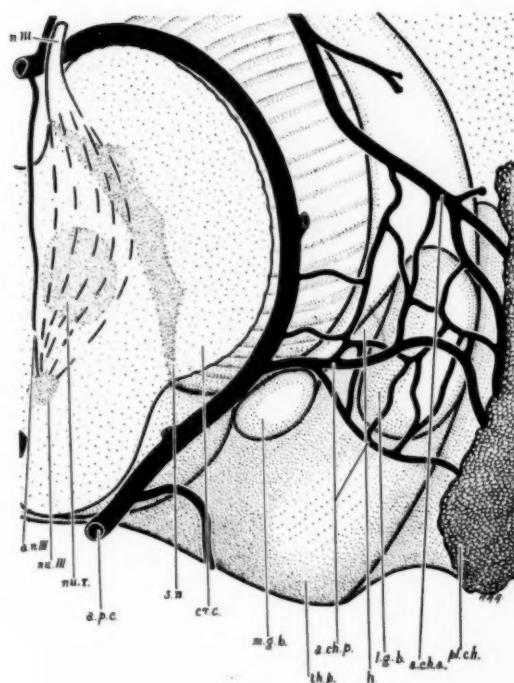


FIGURE II.

The arterial network over the lateral geniculate body (simplified). Note its derivation from the anterior and posterior choroidal arteries. The specific end-artery to the oculomotor nucleus is indicated.

ABBREVIATIONS EMPLOYED IN THE FIGURES.

a.a.c., anterior cerebral artery; a.a.co., anterior communicating artery; a.b., basilar artery; a.c.i., internal carotid artery; a.c.r., central artery of the retina; a.cal., calcarine artery; a.ch.a., anterior choroidal artery; a.ch.p., posterior choroidal artery; a.d.o.p., deep optic branch of the middle cerebral artery; a.m.c., middle cerebral artery; a.n.III., artery to oculomotor nucleus; a.o.p., ophthalmic artery; a.p.c., posterior cerebral artery; a.p.co., posterior communicating artery; a.p.o., parieto-occipital artery; b.o.l., olfactory bulb; c.a., anterior commissure; c.c., corpus callosum; c.q.s., corpus quadrigeminum superior;

c.r.c., crus cerebri; f., fornix; h., hilum of lateral geniculate body; h.a., hilar anastomosis; l.g.b., lateral geniculate body; m.g.b., medial geniculate body; n.III., oculomotor nerve; n.u.III., abducens nucleus; n.u., red nucleus; o.p.ch., optic chiasma; op.n., optic nerve; op.r., optic radiation; o.p.t., optic tract; p.l.ch., choroidal plexus; po., pons; s.cal., calcarine sulcus; s.lun., lunate sulcus; s.n., substantia nigra; s.p.cal., posterior calcarine sulcus; s.p.o., parieto-occipital sulcus; t.p., temporal pole; th.p., pulvinar thalamii.

ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

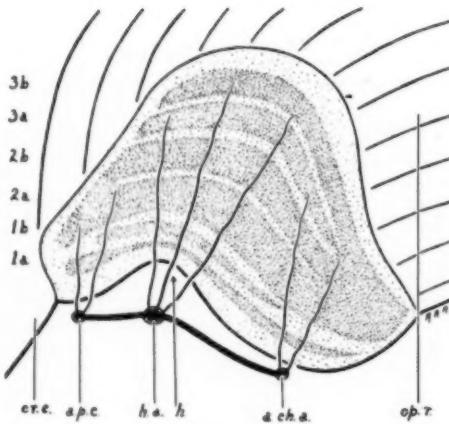


FIGURE III.
Schematic section through the lateral geniculate body to illustrate the sources of supply to its interior. The figures and letters to the left indicate the cell laminae as enumerated by Le Gros Clark and Penman.⁶⁰

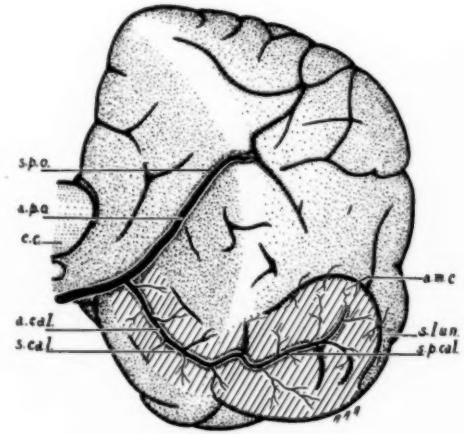


FIGURE IV.
Three-quarter medial view of the occipital pole of the right hemisphere to illustrate the supply to the visual cortex. The drawing was made from a Chinese brain with a well-developed lunate sulcus. Oblique lines indicate the hypothetical distribution of the area striata.

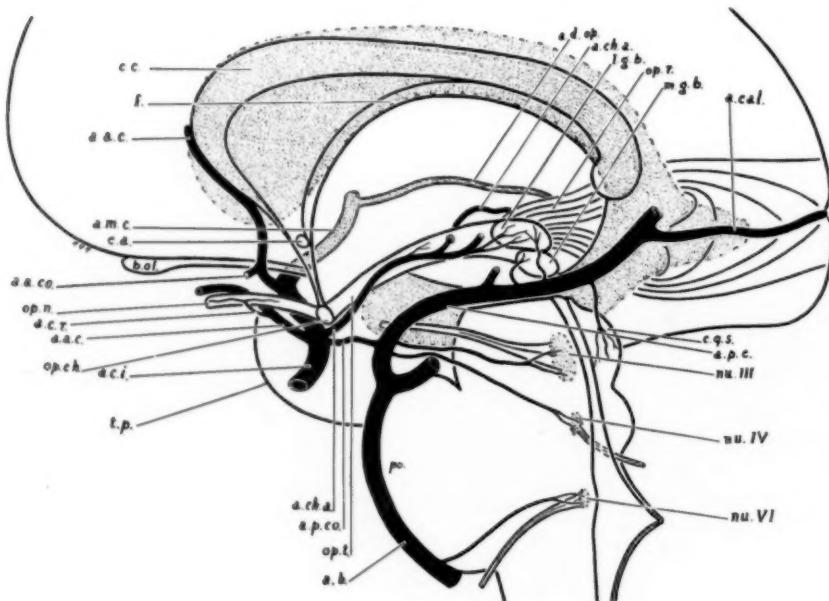


FIGURE V.
Schematic figure of the medial aspect of the right hemisphere and brain-stem, to illustrate the blood supply to the whole of the visual apparatus. Note the manner in which the optic radiations curve around the posterior horn of the lateral ventricle to reach the visual cortex, also the recurrent branch of the central artery of the retina.

ILLUSTRATIONS TO THE ARTICLE BY DR. CARL E. M. GUNTHER.



FIGURE I.
Newly hatched *Trombicula hirsti*, variety *morobensis*
(ventral aspect). Actual size, $176\mu \times 147\mu$.



FIGURE II.
Half-grown *Trombicula hirsti*, variety *morobensis*
(ventral aspect).

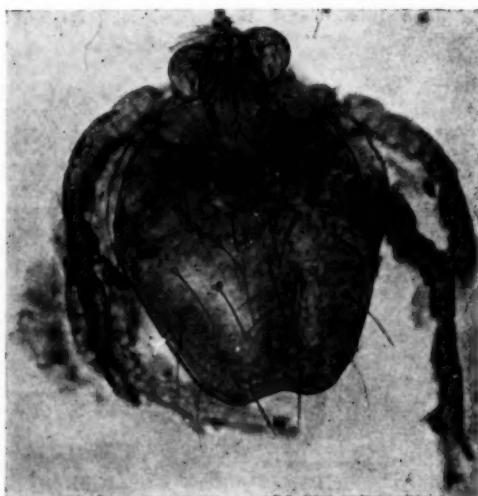


FIGURE III.
Half-grown *Trombicula hirsti*, variety *morobensis*
(dorsal aspect).



FIGURE IV.
Fully engorged *Trombicula hirsti*,
variety *morobensis* (dorsal aspect).
Actual size, $450\mu \times 364\mu$.

ILLUSTRATIONS TO THE ARTICLE BY DR. RICHARD FLYNN.



FIGURE I.



FIGURE II.



FIGURE III.

ILLUSTRATION TO THE ARTICLE BY
DR. REGINALD WEBSTER.

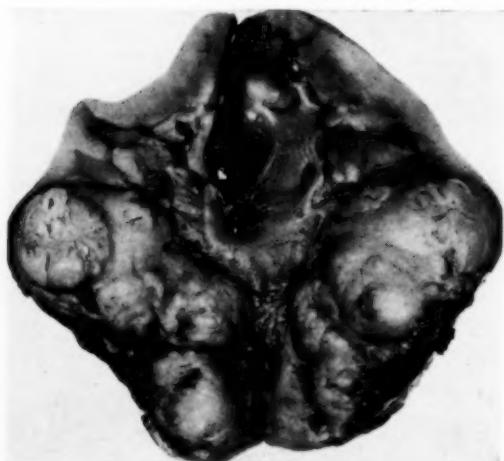


FIGURE XII.

under the garter; on the scrotum; and in the groins and armpits. The bites do not give rise to any symptoms for the first six to twelve hours; then papules, three to six millimetres across, appear; they are topped by a tiny blister and surrounded by a red areola; and they itch intolerably. It is rare to find the larva once the blister has formed; it either drops off or is rubbed off when the itching first develops. (Compare Fontoura de Sequeira.⁽⁶⁾) On account of being scratched, the blisters are usually torn open, and they become infected easily. They then rapidly break down to small indolent sloughing ulcers, very stubborn and inclined to spread. Many tropical ulcers (*ulcus tropicum*) in whites have their origin in "mokka bites".

The larva buries the whole length of its cheliceral fangs in the skin and then projects from between them a long delicate tubule, the hypopharynx; there an irritant secretion of saliva is injected, probably with the power to cause lysis of tissue and facilitate the penetration of the hypopharynx. The hypopharynx shortly becomes surrounded by a thickened adventitia produced by the host's tissues as a reaction against the saliva. It was perhaps the appearance of the hypopharynx, with its adventitia, which led von der Borch to state that "the mite . . . penetrates always along a hair follicle". The nature of these two structures has long been debated; but I have found that in the rat and bandicoot the hair follicles are avoided, and I have not observed them to be penetrated in man. I have a few specimens which show that the mite on some occasions in man certainly did not penetrate hair follicles.

It is not hard to remove the larvae from the skin. A vigorous rub with a thick lather of soap serves to detach them. The use of a soft nail-brush or a coarse sponge over the selected areas is recommended. Zinc cream containing 1% of menthol, well rubbed into any itching spot, relieves the irritation and allows the papule to subside without causing further trouble. There seems to be no useful preparation which will render the skin distasteful to mites. It has often been observed, however, that certain individuals never suffer from their bites, no matter how heavily infested the country through which they travel.

When the histories of the various cases of the disease are analysed some significant points are found.

There is always a history of a recent sojourn in mite-infested country. The eschar is always found in one of the sites favoured by the *bush mokka*. Although ticks abound, no patient has ever given any history of a previous tick bite. In general, during almost seven years I have not personally seen any patient suffering from a tick bite, although I have heard of two cases. There has been no history of previous pediculosis or of flea bites in connexion with any case so far recorded.

Nevertheless it must be admitted that there is on record no history of a preexisting "mokka bite". The usual progress of an ordinary bite has been

described above. If the bite of a mite is the origin of the eschar, then such a bite must follow a different course. It must have had only a slight or else a transient itchiness, otherwise it would have been well scratched and would have become secondarily infected; whereas the outstanding features of an eschar are that it presents neither itching, pain nor tenderness, that it is often unnoticed by the patient for days, and that there is never any history of a previous ulcer at its site. The obvious explanation is that early rapid invasion of the bite by the virus anaesthetizes it, probably as an early stage in the process of necrosis, and that this anaesthesia persists even after the development of the tough black slough with its intensely inflamed areola.

I was so fortunate as to have the privilege of seeing one of Dr. Giblin's recent cases both before and after the development of the eschar. This was of value in providing more evidence in favour of the mite theory and in giving some details of the appearance of the early stages of the eschar. The relevant details are as follows.

The patient was an adult white male, a surveyor. On March 4, 1938, and March 5, 1938, he had been running a line through a *pit pit* swamp which was known to be infested with *bush mokka*, in an area from which at least two cases of endemic typhus had previously been reported. A few days later he noticed a small dusky area on his left shin; it caused no inconvenience, and he gave it no further consideration.

The onset of the actual fever was on March 16, 1938, giving a probable incubation period of eleven or twelve days, which agrees with von der Borch's estimate. At about this time lymphadenitis appeared in his left groin.

I saw him on March 21, 1938. On his left shin was a dusky purple area about eight millimetres in diameter. The skin overlying it was not raised, and appeared to be translucent; the area appeared to be softened, and deeper and darker in the centre. It was neither itchy, painful nor tender. The inguinal adenitis had subsided. Two or three days later a tiny black slough fell out from the centre of the sore. Still it presented no symptoms; a covering of adhesive plaster was applied.

On March 25, 1938, a maculo-papular rash appeared, and on March 26, 1938, I found that his serum agglutinated *Bacillus proteus* Kingsbury at a titre of 1 in 320. On March 30, 1938, he noticed that the sore was irritable, and when the strapping was removed a typical slough was found; it was the same size as the original sore, but was more moist and soft than usual. Surrounding it, where usually there is a red areola, was a ring-shaped blister about three millimetres wide. I presume that the irritation, the moistness of the slough and the formation of the blister were all due to the presence of the strapping for several days.

It remains to be explained why, although hundreds of whites are bitten by *bush mokka* each year (the disease has not yet been found in natives), there have been only about forty cases of endemic typhus recorded during the last five years. There are two possibilities: either the vector is one of the less common species and only occasionally attacks man, or else only occasional members of the commoner species become infected and transfer the disease to man. I am convinced that the latter view is correct; but it will be more convenient to discuss it in the following section.

II. That *Trombicula hirsti*, Variety *Morobensis*, is Probably the Actual Vector.

During the past four years I have collected and examined approximately 3,000 larval mites, comprising fourteen species from seventeen hosts. The detailed description of this survey is now being prepared for publication. The relevant points are that the following species were collected in the numbers and from the hosts shown, and that all were taken in the Morobe district of New Guinea except certain specimens of *Schöngastia yeomansi*.

1. *Trombicula hirsti*, variety *morobensis*.—From three men, 19; from seven bandicoots, 50; from many bush fowl, bush turkeys, cassowaries and ground pigeons, many hundreds; from two species of rail, 3; from bush pig, 80.
2. *Trombicula edwardsi*.—From four bush fowl, 18.
3. *Neoschöngastia jamesi*.—From ten bush fowl, 50.
4. *Neoschöngastia callipygea*.—From two species of bandicoot, 7; from an arboreal "mouse", 2; from many specimens of Brown's rat and the brown bush rat, and from a few specimens of three species of naked-tail rat, many.
5. *Neoschöngastia clauda*.—From seven bandicoots, 60; from thirteen brown bush rats and the various naked-tail rats, many.
6. *Neoschöngastia jimusgi*.—From a parrot, 12.
7. *Neoschöngastia riox*.—From five bush fowl, 20; from a bandicoot, 1.
8. *Neoschöngastia retrocoronata*.—From a bush fowl, 2.
9. *Neoschöngastia fournieri*.—From two bush fowl, 2.
10. *Neoschöngastia incerta*.—From a bush fowl, 1.
11. *Schöngastia rotunda*.—From a bush fowl, 2; from a bandicoot, 1.
12. *Schöngastia yeomansi*.—From two men, near the Suelin River, Aitape district, 15; from a bush fowl, at Bulolo, Morobe district, 2.
13. *Hannemania blestowcei*.—From a cassowary, 1.
14. *Walchia buloloensis*.—From two Brown's rats, 4; from many brown bush rats, many.

Of all the mites collected, approximately 90% were *Trombicula hirsti*, variety *morobensis*, and of this species nearly all were taken from various common birds. A small number were taken from seven bandicoots and from three men. The only other species taken from man was *Schöngastia yeomansi*, in another district.

The following is a reasonable analysis of this information.

1. Since no cases of endemic typhus have yet been reported from the Aitape district, consideration of *Schöngastia yeomansi* as a possible vector must be shelved, the more so as only two specimens, from a bird, were taken in the Morobe district.

2. *Trombicula hirsti*, variety *morobensis*, is the most likely suspect. In the Morobe district it constitutes about 90% of all mites taken, and is the only species which has so far been found on man. Its presence in such overwhelming numbers is certainly due to its affinity for various common birds; but it is found consistently on a bandicoot (*Echymipera cockerelli*). That it has not been found on the other rodent hosts, in spite of its predominance, is sufficient proof that it never occurs on them.

3. The presence of this species in such large numbers is not inconsistent with the possibility of

its being the vector, as the majority of those attacking man must come from birds; but a minority must come from bandicoots.

4. Apart from the possibility that an occasional member of this species might become infected from a rat, and an occasional one of those so infected might pass the disease on to man, there is the probability that the bandicoot is the reservoir, in common with the other rodents. Infection between rats and the bandicoot is possible through the agency of either *Neoschöngastia callipygea* or *Neoschöngastia clauda*.

5. On the other hand, three of the less common species, *Neoschöngastia clauda*, *Neoschöngastia callipygea* and *Walchia buloloensis*, occur on the various rodent hosts, and any one might be the direct vector to man. There is no reason to suppose that they would not attack man; *Schöngastia yeomansi* has been found to do so, proving that this habit is not confined to the genus *Trombicula*.

6. In such a case, however, it is certain that the bandicoot would be infected by either of the first two species, and *Trombicula hirsti*, variety *morobensis*, could also act as a vector.

7. I prefer, therefore, to regard this last as the probable vector, from bandicoot to man, and the others as the probable vectors between the various rodents.

8. *Neoschöngastia riox* and *Schöngastia rotunda* are apparently only occasional parasites of the bandicoot and seem to be very unlikely vectors.

9. The remaining seven species, because they are confined to birds, are quite unlikely to be vectors.

The four photomicrographs of *Trombicula hirsti*, variety *morobensis*, in various stages of growth, were taken with a "Brownie" camera, the technique used being that described elsewhere by the writer.⁽⁷⁾

Acknowledgements.

I am indebted to Dr. N. McKenna, Dr. I. Dickson, Dr. R. H. von der Borch and Dr. W. Giblin for opportunities to examine certain of their patients and records, and for permission to use the information so gained; to the directors and managers of Bulolo Gold Dredging Limited for the encouragement and assistance they have given me in work of this nature; and to the many members of the staff of the company who helped me to obtain specimens of all kinds.

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Reports of Cases.

A CASE OF AN ABERRANT RENAL VESSEL.

By RICHARD FLYNN,
Sydney.

H.K., A FEMALE, aged thirty-eight years, consulted me on account of pain in the left side; she also complained that her appetite was poor and that she slept badly. Her mother had died of pulmonary tuberculosis at the age of twenty-eight years and her only brother had died of the same complaint. Thirteen years previously she had had her appendix removed on account of an attack of acute appendicitis. The patient was a very thin woman, who looked older than her stated age. She informed me that she passed her urine frequently, eight or nine times in the day, four or five times at night, that there was no burning or scalding, but urgency was always present. She complained that the smell of her urine was most offensive. The pain in her left side frequently prevented her working.

The right kidney was palpable and freely movable; otherwise physical examination showed no departure from normal. Examination of the urine showed no albumin or sugar. On account of her family history of tuberculosis a radiograph was taken of her thorax, on which the radiographer reported: "No evidence of tuberculosis, but some chronic bronchitic changes throughout both lung fields."

The radiologist's report on her urinary tract was as follows:

Flat skiagrams demonstrating both urinary tracts are negative for any shadows of radio-opaque density. The renal areas are normal in size and site. Urograms taken after intravenous injection of "Per Abrodil" show both kidneys to be excreting the solution, and the left urinary tract appears free from any gross abnormality. On the right side the appearance of the solution is definitely delayed and there are gross clubbing of all the calyces and some dilatation of the renal pelvis (Figure I). I would suggest further examination of the right urinary tract by the retrograde method of pyelography.

On cystoscopic examination the bladder wall and the ureteric orifices appeared normal. A differential functional test was done with indigo-carmine. On the left side the blue appeared sooner and was much more concentrated than on the right, where it was only a pale blue. Microscopic examination of urine revealed no red blood cells and no pus cells. A right retrograde pyelogram (Figure II) was done. It showed clubbing of all the major calyces and dilatation of the renal pelvis, with very sharp demarcation of the right uretero-pelvic junction, and a further radiograph showed much delay in the emptying time of the right renal pelvis. A provisional diagnosis of an aberrant renal vessel on the right side was made. Operation was advised. I felt that the function of the right kidney was failing, owing to the chronic obstruction produced by the aberrant renal vessel, and that the pain in the left side was a reflex pain or one due to stretching of the renal capsule by the accompanying hypertrophy of the left kidney.

At operation under general anaesthesia the right kidney was exposed and a small vessel running across the uretero-pelvic junction was isolated and divided; then a plastic operation on the renal pelvis, following the technique of Waltman Walters, was performed, and the kidney was fixed in its most favoured position by nephropexy.

The de Pezzar catheter was removed in ten days and the ureteric catheter a week later. The patient left hospital feeling very well. A further excretion urogram (Figure III) was done seven weeks after operation. It

revealed that there were now considerably less dilatation of the right renal pelvis and less clubbing of the calyces. Radiographically the condition is much improved. The radiograph also shows that up to date the kidney has maintained the position it was seen in.

Clinically the patient is much improved and is no longer disturbed by the pain in her left side nor by urgency of micturition. She has regained her appetite and has put on one stone in weight.

Acknowledgement.

My thanks are due to Dr. A. F. Oxenham for his excellent urograms.

PATHOLOGICAL REPORTS FROM THE CHILDREN'S HOSPITAL, MELBOURNE.

By REGINALD WEBSTER, M.D., D.Sc.,
Pathologist to the Children's Hospital, Melbourne.

IX. RENAL CARBUNCLE.

The term "renal carbuncle", a designation which has been employed somewhat loosely in a pathological sense, connotes a well-defined clinical entity and seems to have established itself in surgical literature.

The maximum age incidence of the condition appears to fall in the fourth and fifth decades; but there are not wanting instances of this particular form of renal suppuration in children, indeed in very young infants, and in the pathological museum of the Children's Hospital, Melbourne, are two specimens, a photograph of one of which is reproduced by way of illustration (Figure XII).

The source of the specimen illustrated was the operation of nephrectomy, performed by Dr. D. Officer Brown upon a girl (G.S.), aged nine years, with the happy result of a complete recovery of the child from an otherwise lethal condition. The second specimen in the museum was obtained *post mortem* from a male infant (L.J.), whose prospects of recovery were from the outset very seriously prejudiced by his tender age of three months.

A résumé of the clinical notes concerning these two children will serve to place on record two further examples of a clinical entity, of which the number recorded, as will be seen later, is not very large.

Clinical Histories.

CASE I.—G.S., a girl, aged nine years, was admitted to a medical ward on November 9, 1936, under the care of Dr. W. W. McLaren. Her conspicuous symptoms, the total duration of which was two weeks, were languor, headache, backache and occasional pains in the left side of the abdomen. Micturition was frequent, but apparently had not occasioned any pain or other distress. The girl looked ill. On physical examination a tender mass, the position of which was not affected by the respiratory movements, was palpable below the left costal margin.

During three weeks of observation and investigation the child's temperature ranged from 38.8° C. to 39.4° C. and occasionally reached 40.0° C. Repeated examination of the urine disclosed nothing more helpful than occasional leucocytes and red cells. Attempts at culture were unsuccessful. These findings held also for specimens withdrawn by ureteral catheterization.

The girl was transferred to a surgical ward, and on November 13 Dr. D. O. Brown carried out a cystoscopic examination. Dr. Brown noted a normal vesical mucous membrane and normal ureteric orifices; catheterization of the ureters offered no difficulty and the separate specimens of urine thus secured from the right and left kidneys were macroscopically clear. A pyelogram was made and was subsequently interpreted as showing incomplete filling of the lower renal calyces on the left side. Indigo-

carmine was excreted by the right kidney in eight minutes and by the left kidney in ten minutes. Increasing definition of the tumour in the left lumbar region, persistent pyrexia and leucocytes numbering 29,000 per cubic millimetre, 84% being polymorphonuclear cells, determined Dr. Brown's decision to operate on November 30, 1936.

At the operation the perirenal fat was found to be indurated and oedematous. The kidney when exposed was seen to be enlarged and oedematous, presenting a club-shaped lower pole, which was firmly adherent to extrarenal tissue. When the organ was freed, necrotic patches were observed on the lower pole as it was delivered from a small perinephric abscess.

Gram-positive cocci with the typical morphology of staphylococci were sufficiently numerous in smears of pus obtained from the central portion of the lesion to be found without difficulty, and cultures from the same source resulted in profuse and pure growths of *Staphylococcus aureus*. Although it was felt that the presence of tuberculosis was very improbable, a search was made for tubercle bacilli; the examination resulted in a negative finding.

CASE II.—L.J., a male infant, aged three months, was brought to the out-patients' clinic of Dr. W. R. Forster on November 15, 1937. His mother stated that the baby appeared to have made no progress since he was three weeks old, and drew attention to a swelling which she had noticed in the child's abdomen. On clinical examination the abdomen was observed to be rather protuberant, with pouting umbilicus. A visible and palpable swelling was present in the left loin, on its lateral aspect, extending well below the costal margin, rounded in shape, of irregular surface and firm consistence. The mass was not movable and did not appear to move with respiration.

The most probable pathological basis for the clinical condition presented by the infant seemed to be either hydronephrosis or pyonephrosis, sequent on congenital stenosis of the ureter or a congenitally cystic kidney. Examination of the urine revealed the presence of very numerous pus cells, with which were associated large numbers of Gram-positive cocci; and culture from the urine yielded copious growths of *Staphylococcus aureus*.

Dr. Forster carried out a cystoscopic examination, from which it appeared that the vesical mucous membrane and ureteric orifices presented no abnormality. An attempt to make a pyelogram was unsuccessful, owing to the difficulty encountered in catheterizing the ureters in so young an infant.

On November 23 Dr. Forster operated, making a lumbar incision on the left side. Thick yellow pus escaped from the perirenal fatty tissue, and a collection of pus, the evacuation of which occasioned considerable diminution in the size of the abdominal mass, bathed the left kidney on its posterior aspect. The original objective of the operation was nephrectomy, but as it proceeded the condition of the diminutive patient was such that Dr. Forster deemed it inadvisable to attempt anything further than to provide for drainage of the perinephric abscess. The baby unfortunately died on the day following the operation.

The autopsy was carried out by Dr. Ian Wood, who found great enlargement of the left kidney occasioned by a large abscess at the lower pole of the organ, associated with which were several subsidiary abscesses in the upper pole. One of the minor abscesses was situated immediately subjacent to the renal capsule, and appeared to have been incised at operation. The renal pelvis was not dilated to any notable degree, and there was no stenosis at the uretero-pelvic junction. By dissection of both ureters, the bladder and urethra, it was determined that these structures were of normal size and appearance, presenting no point of stenosis anywhere in the urinary tract. It should be noted that there was no suppuration in the opposite kidney, nor indeed anywhere in the thoracic or abdominal viscera.

Corresponding with the result of the bacteriological examination of the urine made *ante mortem*, the *post mortem* culture from the kidney yielded profuse growths of *Staphylococcus aureus* in pure culture.

Discussion.

The term "renal carbuncle" seems to have been adopted in clinical usage to describe a unilateral localized suppuration in the renal parenchyma, of metastatic origin, situated most frequently at one or other pole of the kidney, where it gives rise to a bulging alteration in the contour of the organ. It becomes apparent, however, on examining the records of the reported cases that the term "carbuncle" has been somewhat loosely employed. By a "carbuncle" one understands a lesion comprising several adjacent and eventually communicating centres of infection, culminating in tissue necrosis and sloughing rather than in free suppuration. Many of the lesions embraced by the description "renal carbuncle" in its clinical acceptation would be more precisely considered as multilocular cortical abscesses, and a true "carbuncle" of the kidney would appear to be of very rare occurrence.

It is generally agreed that the renal suppuration is of metastatic origin, initiated by a bacterial embolus of one of the intralobular arteries of the kidney, and that the microorganism concerned is almost invariably the *Staphylococcus aureus*. Complete occlusion of the artery results in septic infarction and necrosis of a wedge of tissue embracing the whole width of the renal cortex distal to the point of lodgement of the embolus; partial occlusion determines a cortical abscess or "boll". Occasionally the blood-borne microorganisms are possessed of such necrotizing powers as to induce a true carbuncle.

The suppuration thus originated frequently extends by the establishment of secondary circumferential foci, and so a multilobular abscess, which may attain a large size and distort the outline of the kidney, is evolved. Perinephric suppuration is the next stage, and it is commonly reached.

The unilateral occurrence of the particular form of renal suppuration under discussion is a fact difficult of explanation. In emphasizing the unilateral character of "renal carbuncle", M. T. Campbell¹⁰ states that a bilateral incidence of lesions of this nature has been described only twice.

Another point in the morbid anatomy of the condition, important clinically because of its bearing on the urinary findings, is that communication between the suppurative focus and the excretory tubules of the kidney is not necessarily established. Also, according to B. M. Dick,¹¹ although outward extension of the suppurative process may occur, with resulting perinephric abscess, a leakage into the renal pelvis is a very unusual happening.

It will have been noted that in the first of the two children under discussion no changes of diagnostic significance were found in the urine by microscopic and cultural examination. In the very young infant the urine reflected the condition in the kidney, containing numerous pus cells and yielding profuse growths of *Staphylococcus aureus*. The urinary findings in the two children were thus in sharp contrast, and exemplify well the variability in this respect noted by Graves and Parkins¹² in their review of 67 cases of "renal carbuncle". The observers named found that the urine was normal in sixteen instances; in the remainder a pathological state was indicated by the presence, microscopically discovered, of pus or blood or both. Dick,¹¹ whose article antedated that of Graves and Parkins¹² by seven years, found twenty-seven recorded cases of the particular form of renal suppuration under consideration; and, with reference to the important question of the features of the urine, concluded that microscopic examination of the urine was most frequently attended by negative findings, that catheter specimens were usually sterile, and that a few leucocytes and erythrocytes might be found from time to time, but were never abundant.

Apparently, therefore, no royal road to the diagnosis of renal carbuncle is to be found in the direction of examination of the urine.

The occurrence in children of two examples of localized massive suppuration within the renal parenchyma, one in November, 1936, and the other in the corresponding month

of 1937, prompted me to consult the literature on the subject, with reference particularly to the number of cases reported and to the age incidence of the condition.

Graves and Parkins¹⁰ contribute an analysis of sixty-seven cases, the number including one reported by themselves. In this series there were three instances of "renal carbuncle" in infancy, two of the patients being eight weeks and the third nine months of age. The two babies of eight weeks, with whose case records the second of those herein reported may now be grouped, were the subjects of a report on renal carbuncle in infancy by M. T. Campbell.¹¹ Apparently the condition may occur at any age, with a maximum incidence in the fourth and fifth decades.

Graves and Parkins give references to seven case reports which appeared after their analysis was compiled, thereby bringing the total of recorded cases of "renal carbuncle" to seventy-four in January, 1936. Either the condition is very uncommon or it has not come much within the experience of observers who considered that it merited special attention.

The immediate specific cause of the renal suppuration has already been noted as the *Staphylococcus aureus*. Among the sixty-seven patients reviewed by Graves and Parkins,¹⁰ forty-two had furuncles, carbuncles or smaller multiple septic skin foci. Furunculosis of the skin was an antecedent in the clinical histories of both the babies reported by M. T. Campbell.¹¹ Dick¹² considers the discovery of a recent skin lesion a valuable aid to diagnosis. In passing, it is of interest to note that the time elapsing between the initial superficial infection and the onset of illness due to metastatic renal suppuration has varied from a few days to many months, and in Graves and Parkins's¹⁰ series averaged fifty-three days.

In neither of the two children who provided the specimens of "renal carbuncle" in the pathological museum at the Children's Hospital was any infective process of the skin or evidence of recently healed skin lesion apparent. In the case of the infant aged three months there is the possibility that the umbilicus had served as the portal of entry for the staphylococcus, although there was no clinical evidence of umbilical sepsis.

The same situation, a haemogenous staphylococcal infection with no obvious source, such as furunculosis or impetigo, arises commonly in acute osteomyelitis; and in discussing such cryptogenetic osteomyelitis I have often remarked on the frequency with which the *Staphylococcus aureus* appears in cultures from the nasopharynx, from the mucopus of antral and frontal sinusitis, and from the sputum. Entry of the staphylococcus to the circulation via the upper respiratory passages, and consequent metastatic suppuration, would appear to be a proposition just as feasible as that generally accepted in explanation of the sequence of events producing such lesions as pneumococcal and tuberculous arthritis. In a recent discussion of pathogenic staphylococci, Professor Joseph W. Bigger¹³ emphasized the nose and nasopharynx as important sites from which staphylococci spread to other parts of the body of the same person or to other persons. Transference of staphylococci from the nasopharynx of one individual to another involves the conception of the "carrier" state with respect to staphylococci; but I confess that my speculations have not carried me thus far.

References.

¹⁰ M. T. Campbell: "Renal Carbuncle in Infancy", *The Journal of the American Medical Association*, Volume XCIV, Number 20, May, 1932, page 1729.

¹¹ B. M. Dick: "Staphylococcal Suppurative Nephritis (Carbuncle of the Kidney)", *The British Journal of Surgery*, Volume XVI, 1928-1929, page 106.

¹² R. C. Graves and L. E. Parkins: "Carbuncle of the Kidney", *The Journal of Urology*, Volume XXXV, January-June, 1936, page 1.

¹³ Joseph W. Bigger: "The Staphylococci Pathogenic for Man", *The British Medical Journal*, October 30, 1937, page 837.

INCONTINENCE OF URINE TREATED SURGICALLY.

By P. A. STEVENS, M.B., Ch.B.,
Surgeon to the Proserpine Hospital,
Queensland.

The following case is reported because it illustrates the successful treatment of a condition which, although rare, is most distressing.

Clinical History.

Miss R., aged fifteen years, came for treatment for severe incontinence of urine, which had been present all her life, and for which she had received medical treatment on several occasions. She had a continual struggle to hold her water; and if she coughed or laughed or made any extra exertion her urine escaped. Once the leakage started, the bladder emptied itself. She wet the bed nightly. Her general physical condition was good. Her mental condition was one of extreme sensitiveness and timidity.

Examination revealed a congenital abnormality. The urethral orifice was large and misplaced posteriorly for a distance of about 1.25 centimetres (half an inch) from the normal position. It was wide open; and it was almost possible to see into the bladder, the diameter of the urethra being about that of an ordinary lead pencil. On passage of a sound into the bladder no resistance was encountered at the neck of the bladder.

Operation was undertaken.

A wedge-shaped portion of the urethral orifice was excised, the excision extending for about 1.25 centimetres (half an inch) into the floor of the urethra. The incision was continued in the line of the urethra, the hymenal margin being cut through to a point opposite the neck of the bladder. The urethra was exposed and the dissection was carried along the urethra till the neck of the bladder and the urethral origin were well displayed. Three cut-gut sutures were placed so as to approximate the fibres of the two bulbocavernosus muscles. The muscular coat of the bladder was included in the first suture. The result of the three sutures was to surround the origin of the urethra with a circle of muscle and also actually to kink the urethra and close its lumen. The closure of the incision narrowed the urethral orifice to one-third of its former size. A small catheter was left in the bladder for three days and the patient was kept in bed for five days.

The result was a complete return to normal. On the eighth day the patient was instructed to hold her urine as long as possible. She held it for ten hours, and then voluntarily emptied the bladder because of the pain caused by distension. Enuresis occurred once, on the night following the removal of the catheter. Three weeks after leaving hospital she was again seen. She had by then regained confidence in her bladder control and was going out without fear. She passed urine three times a day, and had no leakage. She awakened from sleep every night with a desire to pass water, but no wetting of the bed occurred. She feels at present that she is cured.

Discussion.

In planning and carrying out this operation certain physiological principles were considered, and the result is attributed to a recognition of these. They are the following.

1. The female urethra "will not hold water". Unless there is a complete blockage from a stricture or growth, once urine leaves the female bladder it will escape. Physiologically, there is nothing to hold the water in the urethra. Plastic surgery on the urethra will not cure incontinence; the neck of the bladder is where control must be established. In the present case the urethra was narrowed at its orifice to protect the wide-open approach to the bladder.

2. In this case the kinking of the urethral origin acted as a valve which helped to close the urethra when the

bladder was full. The normal tension of the bulbocavernosus muscles is voluntarily relaxed by a general voluntary relaxation of the muscles of the pelvis.

3. Normally the bladder is closed by its sphincter and by the neighbouring muscles, by the bulbocavernosus muscle, by the ischiocavernosus muscle in part, and by those muscle fibres which receive the name of *compressor urethrae*. In normal micturition both voluntary and involuntary muscles are involved. The voluntary initiation of the act is brought about by the voluntary relaxation of certain voluntary muscles; and therefore to bring about a cure the construction of an involuntary muscle sphincter is not enough. Voluntary muscle is needed, in this case the bulbocavernosus muscle.

Acknowledgement.

In conclusion, I wish to thank Dr. Malcolm Earlam for kindly reading the proofs of this report.

Reviews.

MYOCARDITIS.

A SLENDER book with the title "Myocarditis" excites our interest, for modern pathological restrictions limit the subject considerably.¹ This volume contains six of the St. Cyres Memorial Lectures, established by an endowment of the late Viscountess St. Cyres, which provides for the delivery of an annual lecture on this subject. Fortunately the lecturers have not considered themselves bound by the strict meaning of the word "myocarditis", and thus we have lectures on such different subjects as "The Fibroses of the Heart" and "The Heart and Circulation in Beri-beri".

As the first of these lectures was delivered in 1927, they are of distinct value as a pointer to the steady march of knowledge of the degenerative changes of the myocardium. Dr. Strickland Goodall's contributions are as interesting and provocative as might be expected from memories of his stimulating teaching at the National Heart Hospital, and his lecture on "The Right Side of the Heart" has a striking pendant in Professor Wenckebach's clear exposition of the heart in beriberi. Dr. John Hay's chapter on "Certain Aspects of Coronary Thrombosis" carries on the story of this now well-known syndrome up to 1933, and lays emphasis on atypical cases, which are illustrated with histories and graphic records.

This little book is clear and pleasant to read, even if all of it is not up to the minute in the views and information set forth; and it is to be regretted that the lecture given by Sir Thomas Lewis was not included, as no record of it was available. It is to be hoped that future series of these lectures will be published in this convenient form.

THE DREAMS OF CHILDREN.

Dr. C. W. KIMMINS, who for many years was chief inspector of London County Council schools, has written a short work on children's dreams.²

It consists of an introductory and nine other chapters dealing with a very large collection of children's dreams. In all he has collected and investigated over 2,000 dreams.

¹ "Myocarditis: The St. Cyres Memorial Lectures", by J. S. Goodall, F.R.C.S., F.R.S., K. F. Wenckebach, M.D., F.R.C.P., R. O. Moon, M.D., F.R.C.P., J. Cowan, M.D., D.Sc., F.R.F.P.S., and J. Hay, M.D., F.R.C.P., D.L.; 1937. London: Eyre and Spottiswoode Limited. Demy 8vo, pp. 152, with illustrations. Price: 10s. 6d. net.

² "Children's Dreams: An Unexplored Land", by C. W. Kimmings; 1937. London: George Allen and Unwin Limited. Crown 8vo, pp. 121. Price: 4s. 6d. net.

Anyone familiar with dream analysis would at once realize that the full analytical interpretation of such a large number of dreams is impossible. The author does not claim to have even attempted such a task, but merely relates the dreams of children of various age groups and attempts a rough classification of the type of dream peculiar to each age period.

Dr. Kimmings does not believe that the fundamental mechanism of the dream is a wish fulfilment, although he acknowledges that many dreams are of this nature, for example, dreams of riches by poor children. It would appear that he bases his classification of dreams on the manifest dream content, not realizing that the content, that is, the dream as related by the dreamer, is a disguised and distorted account of the real underlying mental mechanisms. Thus he evolves such descriptive terms as "fear dreams", "kinaesthetic dreams", "compensation dreams", and so on. He has no explanation to offer as to the cause or meaning of these dreams.

It is therefore apparent that Dr. Kimmings has not mastered the actual meaning and function of the dream. He regards the dreams of normal children as being quite distinct from those of neurotic adults or even neurotic children. That there is a superficial difference may be true, but we cannot agree with the view that there is any fundamental difference between dreams of neurotic and normal people; for after all the dream is itself a "neurotic" mechanism, no matter in whom it occurs, and it is difficult to draw a line of demarcation between normal and neurotic personalities.

Chapter IX deals with the dreams of blind and deaf children. It is said that the dreams of blind children are often visual and those of deaf children often auditory. The author does not make it quite clear whether he means that children born deaf have auditory dreams, but he does make it quite clear that children born blind never have visual dreams. This chapter is one of the most interesting of the book. The others are mainly descriptive of different types of dreams by children of different ages, different social classes *et cetera*. Although the author gives a plain account of many of these dreams, nothing really fundamental can be learned from them.

Taken as a whole, the book is rather amateurish for the medical psychologist, but it might find a suitable place in the library of the educationist.

Notes on Books, Current Journals and New Appliances.

A PHARMACOPEIA AND GUIDE IN TROPICAL MEDICINE.

THE Pharmacopeia and Guide produced by the medical staff of the School of Tropical Medicine and Carmichael Hospital for Tropical Diseases, Calcutta, is a small volume that will be useful to students attending the school and also to others who are interested in tropical medicine.¹ It consists of a list of the formulæ for various preparations used at the Carmichael Hospital for Tropical Diseases, posological tables, notes on the employment of certain therapeutic substances, notes on the diagnosis and treatment of a few diseases commonly encountered in the tropics, *et cetera*. Some of this would have been better left out. No more than the most superficial discussion of disease is possible in a pocket-book such as this. Unfortunately there are people who are content with a superficial knowledge, and for their satisfaction a superficial description is all that is required. But such people should not be encouraged.

¹ "Pharmacopeia and Guide of the School of Tropical Medicine and Carmichael Hospital for Tropical Diseases, Calcutta"; 1936. Calcutta: Art Press. Demy 18mo, pp. 164.

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The Medical Journal of Australia

SATURDAY, AUGUST 6, 1938.

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NATIONAL FITNESS.

THE apparent improvement in the physical fitness of young Germany has made a deep impression on other nations. Great Britain has voted £2,000,000 as a first national contribution to a scheme for the improvement of the physical fitness of her youth. In this country the *Melbourne Age* has quite recently launched a "National Fitness Campaign". Whilst any measures which can improve the physical health and standing of youth should have the whole-hearted support of all classes of the community, the plan of campaign should be very carefully thought out, lest the bill for social services be greatly increased without commensurate result.

Physical fitness in a person may be defined as that state of mind and body which permits him to serve with the highest efficiency. If the standard of physical fitness of our people is not what it should be, the cause must be carefully investigated before any expensive treatment is recommended. No amount of training by specially appointed physical

culturists can overcome the ill effects on our children of defects in growth processes manifest before the school leaving age. Further, it may not be expedient to educate in boxing or other violent exercises those who have great mental ability or a high degree of manual skill.

Any scheme for the raising of the physical standards of youth must first deal with those developmental and environmental factors which lead to unfitness. The importance of developmental factors is fully realized by those engaged in pastoral pursuits; but only the most ardent advocates of the science of eugenics are sanguine of its general application to those who enjoy an excess of personal liberty. Nevertheless every avenue should be explored to find employment for youth, so that early marriage may be made possible. It is not so much the improvement in physical fitness which has changed the outlook of youth in Germany as the fact that youth now has hope where previously it despaired. Granted that their physical fitness has a military aspect, they at least feel that they have a stake in the country, whose leaders are mostly young men. Furthermore, the conception of breeding a pure Aryan race, whilst scientifically unsound, has the effect of creating a national pride of race and of generating children who will grow up with sympathetic fathers. The father who is too old to enjoy the open air life with his children, the father whom children irritate, is incapable of giving that joy of life to his family which is the foundation of all national fitness. In this country the marriage age of those who possess the mental qualities and have gained the financial endowment to train and feed children is being too far extended.

The environmental factors leading to physical unfitness are numerous but in the main preventable. They include disease, bad feeding, bad housing, bad school training and many other conditions. Can the owners of sepulchral flats ask and expect youth to defend their property? London puts Sydney to shame in her open places. But where are the grounds which used to adorn the southern shores of Sydney Harbour? Not only are there few playgrounds, but in many localities children are denied housing, although wireless is allowed full play.

The articles in *The Age* rather avoided the military aspects of the physical training of those over school age. But if youth has hope and a stake in the country, it should surely be a matter of honour that he make himself physically fit to take his place with older men in the defence of his country. There should be no delay in the physical training of young men who have left school, although many who participated in the Great War would prefer to fight alongside that cheeky little underdeveloped "Tommy" in whom courage and endurance took the place of physical fitness.

If our anxiety for the health and strength of our sons and daughters is genuine and not hypocritical, we should be zealous in the care of the nation's children, see that they are adequately fed, provide good housing and playing fields, and relieve the drudgery of study with an organized attempt to promote their physical development.

Current Comment.

THE CLINICAL EFFICACY OF DIGITALIS PREPARATIONS.

As a result of the efforts of manufacturers of proprietary medicines who have vied with each other in widening the range of preparations purporting to supplant tincture of digitalis, considerable confusion has occurred in many minds as to the merits of these newer substances and their quantitative relationship to the standard doses of the tincture. In America this confusion has reached its height, and William D. Stroud and Joseph V. Van der Veer have attempted in a recent lecture at the eighty-eighth annual meeting of the American Medical Association to clarify in the light of modern knowledge the exact indications and contraindications of digitalis medication, to review briefly the mode of action and method of administration of the drug, and to discuss the therapeutic merit of several special preparations of the isolated digitalis glucosides.¹ As Stroud has devoted six years to the collection of this information, the brief review of his conclusions should be of the greatest practical interest. He states in the first place that it is still a common practice to prescribe digitalis for tachycardia only, that is, for the purpose of slowing the heart rate in fever, hyperthyreoidism, peripheral circulatory failure or sympatheticotonia. Needless to say digitalis is of no advantage in the treatment of these conditions and may be definitely dangerous when administered in larger doses.

According to Stroud and his associates digitalis exerts its therapeutic benefits in one or more of three ways only: it slows the heart rate and so allows better diastolic filling; it increases the cardiac tone as a result of muscle shortening; and it lengthens the extent of ventricular contractions. To these may well be added the creation or increase of heart block which so effectively prevents over-stimulation of the ventricles in auricular fibrillation or flutter. The exact stage of cardiac failure at which the aid of digitalis should be invoked is also of the greatest importance. Certain studies suggest that the efficiency of the normal heart and the rate of flow in the coronary arteries are both diminished by digitalis, but there is also a stage in the progressive dilatation and hypertrophy of the labouring myocardium at which digitalis seems to improve the efficiency of the heart muscle. Hypertrophy and dilatation, if unchecked, increase until a certain optimum length of the fibres of the heart muscle is exceeded, when a decrease in the cardiac output results and signs of heart failure gradually or suddenly appear. On the basis of this hypothesis it is the physician's responsibility to estimate just when the stage has been reached at which the exhibition of digitalis will preserve the cardiac output by increasing the tonicity and extent of ventricular contraction.

The vast majority of patients may be given digitalis by mouth. Although the emetic action of the drug is not due to a direct irritation of the gastric mucosa, but is a reflex effect from the action of the drug on the heart, occasionally neurotic vomiting due to knowledge by the patient of the toxic effects is encountered. Intravenous digitalis therapy is seldom indicated.

Stroud, speaking for the American physician, states that tablets, capsules or pills of powdered digitalis leaves are more practicable therapeutic substances than the tincture. Certainly they are often better preserved, and freshness of the drug is essential. Moreover, tablets and pills are a much more accurate means of dosage than a dropper, and such preparations are more portable. In emergency therapy by these means the large dose method is seldom necessary, as in 24 to 48 hours full "digitalization" can be accomplished with doses of four and a half to six grains administered every six hours, but requires a week when a dose of one and a half grains is given three times a day to the ambulatory patient. The average maintenance dose in each case is about one and a half grains daily. It should be noted that this maintenance dose, given in a properly standardized tablet, capsule or pill of digitalis leaves, is equivalent to 15 minims or 45 drops of the standardized tincture.

The clinical comparison of the different preparations of digitalis is a difficult procedure. Fortunately in the majority of cases a fairly wide margin exists between the minimum dosage necessary for the optimum action of the drug and the maximum dosage which can be tolerated without toxic effect. Fifty-six patients studied over a period of six years presented results which were considered

¹ *The Journal of the American Medical Association*, November 27, 1937.

satisfactory for analysis. Some had already received digitalis; others had not. All were at rest in hospital, and in each case the optimum dose of a given preparation was determined by a clinical trial.

For such a study it is essential that a large number of patients should be observed over a sufficiently long period. The natural history of the disease, the individual variations of the patients and the personal standards of the observer are all important. The intervention of complications may also alter the course of the treatment. Patients with established auricular fibrillation and rapid ventricular rates are the most satisfactory test material. There appeared to Stroud to be little relationship between the weight of the patient and the dose of digitalis required; for practical purposes, he states, the body weight need not be considered. The requisite amount of the drug can be determined only by a clinical trial. It must be remembered that the more severe the heart damage, the less the margin of safety in the use of digitalis. The release by proprietary firms of digitalis preparations, before comparative dosages of the drug have been determined, is to be deprecated. The better result from a given preparation of digitalis than from another may be due to its relatively greater content of potent substance rather than to its greater efficacy. Stroud and his collaborator found no evidence that "digitalization" was effected more rapidly with any of the glucoside preparations than with the digitalis leaves when they were given in corresponding amounts by mouth. The glucoside preparations tested were uniformly potent and stable; the clinical results from their use were similar and in no way superior to those obtained with the standard digitalis leaves.

It is possible that in the future the chemical isolation and standardization of digitalis glucosides may determine the method of treatment, but for the present it seems better that all the glucosides should be available in the form of the whole leaf powder. Flooding of the market with new preparations of a drug is not necessarily a sign of therapeutic progress.

ICTERUS GRAVIS NEONATORUM.

ICTERUS GRAVIS NEONATORUM has been the subject of several recent papers, and is now a well-defined clinical entity. The earlier accounts of this severe and often fatal disease were somewhat confused, as some writers failed to distinguish it from a similar condition found in syphilitic infants, while others attributed it to tuberculosis, and others again applied the term "icterus gravis" to the jaundice associated with some forms of sepsis in the newly born. It is now recognized that *icterus gravis neonatorum*, universal oedema (*hydrops foetalis*) and congenital anaemia are related conditions, and it has been shown that the intravenous transfusion of sufficient quantities of blood yields dramatic results in *icterus gravis* as well as in congenital

anaemia. Ruth Darrow observes that the cause of this condition is still a subject of speculation.¹ No direct evidence of any hereditary factor has been found, although there is a definite familial incidence. When a woman has given birth to a child with *icterus gravis*, hydrops or congenital anaemia, there is a tendency for later children to suffer from *icterus gravis*. These three conditions are related, not only by familial incidence but also by the presence of erythroblastosis. "Erythroblastosis" is a term coined to describe the presence of extramedullary foci of haematopoiesis, associated with enlargement of the liver and spleen, pallor of the tissues, and jaundice or oedema. Extramedullary foci of blood formation, in spleen, liver, kidneys, suprarenals and other organs, are most numerous in *hydrops foetalis*; they may be indefinite or even absent in the other two conditions. Erythroblastosis has been found in infants which are otherwise normal. The familial incidence of *icterus gravis*, hydrops and erythroblastosis is the most constant link between these three conditions. A curious feature is that the affected children are not distributed at random among the offspring of their parents, as would be expected if a dominant hereditary defect were present. Normal children are born first. Following the birth of the first affected child, one or other of these conditions occurs in any child born subsequently to the same mother. Salomonsen, among others, reported the case of a family in which healthy parents had four children, the first of whom was living and well, while the second had *icterus gravis*, the third hydrops with erythroblastosis, and the fourth *icterus gravis*.

Darrow believes that the two fundamental pathological changes are the abnormal destruction of red cells and hepatic dysfunction due to injury. She elaborates an ingenious theory of causation, based on the supposition that the destruction of red cells is some form of immune reaction. The sequence of events may be as follows. The mother develops an active immunity against foetal red cells, or some component of them. This may conceivably occur as the result of an accident within the placenta whereby the foetal cells or their haemoglobin gain entrance to the maternal blood sinuses. The antibodies formed in the maternal organism may then pass to the child through the placenta or possibly to an even greater extent through the colostrum and milk. Each child born and suckled subsequent to this active immunization of the mother would possess to a greater or less degree a passive immunity to the specific antigen, while children born before the immunization of the mother would be entirely unaffected. These facts have been demonstrated in guinea-pigs. Such an antigen-antibody reaction explains not only the familial tendency but its distribution in affected families. This mechanism bears no relationship to a difference in blood group in mother and child; nor is such a difference a factor in this group of diseases.

Abstracts from Current Medical Literature.

PAEDIATRICS.

Continuous Intravenous Therapy for Infants and Children.

WILLIAM C. BLACK (*Archives of Disease in Childhood*, December, 1937) describes in detail the equipment and technique which give the most consistently good results in the continuous intravenous administration of fluids to infants and children. Success depends upon careful attention to certain simple details. It should be recognized at the outset that the aim of the procedure is to place the catheter in the vein with the minimum of trauma to the vein, and to fasten the catheter in place in such a way that the child may move about and be moved without any change being caused in the relation of the catheter to the vein, without rotation, pulling, pushing or side traction. Because of its constant position in practically all individuals, and its situation on the lower extremity, where the attachment of the apparatus causes a minimum of inconvenience both to the patient and to those attending him, the vein of choice is the great saphenous vein, where it runs across the ankle just anterior to the medial malleolus. Details of the technique are given. The author points out that the results of administration of fluid by the continuous intravenous drip method have been improved by the recent adoption of two simple adjustments, which diminish the tendency for blood to regurgitate into the catheter and coagulate there. First, the patient's foot is elevated by means of pillows several inches above the level of the base of the heart during as much of the time of administration as possible. Secondly, the nurse is instructed to open the stopcock to permit a maximum rate of flow for a few seconds every hour. When the drip is discontinued the two ligatures are gently cut away from the vein and a fairly firm moist dressing is applied in such a way that the edges of the wound are approximated. The author believes that the vein probably becomes patent again eventually. Hypertonic solutions are irritating to the wall of the vein and are prone to cause thrombosis. If they are used, they should be alternated with isotonic solutions. If the drip slows down unexpectedly, the tube should be disconnected and the catheter aspirated with a Luer syringe. This will often reestablish a free flow, apparently by dislodging a tiny flake of fibrin. If the flow should stop, no attempt should be made to clear the obstruction by the application of positive pressure. It is only permissible to aspirate gently, and if this is unsuccessful, either to remove the catheter and replace it with a new one or to

choose another vein and make a fresh start. If transfusions are to be given while the drip is in use, the blood may be injected through the catheter. This is most conveniently accomplished, by clamping the tubing an inch or two distal to the point where it emerges from the bandages. The rubber tubing is sterilized between the clamp and the bandages with tincture of iodine, the sterilized tubing is punctured with the needle connected with the reservoir of citrated blood, and the blood is permitted to run in either by gravity or by positive pressure from a Luer syringe connected with a three-way stopcock inserted between the needle and the tubing connected with the reservoir of blood. The hole in the tubing will seal itself when the needle is removed, and when the clamp is removed the drip will continue as before.

The Availability of the Iron of Grape Juice.

WILLIAM FISHBEIN, JOSEPH K. CALVIN AND JOHANNA HEUMANN (*Archives of Pediatrics*, January, 1938) have made an effort to establish, by clinical observation, the availability of iron in grape juice. Sixty children, all receiving the same basal diet of an average quality and nutritional balance, were divided into two groups of thirty children each. One group served as controls, while the children in the other group were given, in addition to the basal diet, ten ounces of grape juice daily. Both groups were observed during a period of 36 days, to ascertain the effect of grape juice on the regeneration of haemoglobin. Haemoglobin estimations were made in all subjects at the beginning of the study, after thirty days, and at the conclusion of the study. It was demonstrated that in the group receiving grape juice the haemoglobin content of the blood increased at approximately twice the rate of the controls. The authors conclude that grape juice aids in the regeneration of haemoglobin and is a good source of iron, and that the addition to the diet of 280 cubic centimetres of grape juice daily aids in the prevention of secondary anaemia. In view of the consistent increase in haemoglobin content in children with definite secondary anaemia, the authors conclude that grape juice is of use in the treatment of this disease.

Congenital Heart Disease.

STANLEY GIBSON AND WILLIE MAE CLIFTON (*American Journal of Diseases of Children*, April, 1938) have reviewed the clinical and post mortem findings in 105 cases of congenital heart disease. The relative incidence was much greater in infants than in older children. Of the 105 cases, 65 were instances of arterio-venous shunt, 25 of venous-arterial shunt, and in 15 there was no abnormal communication between the systemic and the pulmonary circulation. An analysis of the 65 instances

of arterio-venous shunt showed that in 23 a defect of the interauricular septum was present, in 17 a patent *ductus arteriosus* was found, in 12 there was a defect of the interventricular septum, and in 13 cases there were combined lesions. Symptoms appeared late or were absent. The only characteristic auscultatory finding was that obtained in cases of defect of the interventricular septum. A harsh systolic murmur over the pericardium was heard in practically every case of this type. The rarity of the humming-top murmur in cases of patent ductus was surprising. The majority of children in whom a permanent venous-arterial shunt occurred presented one of two conditions: complete transposition of the great vessels or the tetralogy of Fallot. All were cyanotic; the span of life was brief in the majority, and in all the cardiac condition was the cause of death. Of the fifteen children whose cardiac lesion did not allow abnormal communication between the systemic and the pulmonary circulation, some were free from symptoms and signs, while others succumbed to heart failure. Cardiac findings in seven cases of mongolism showed a variety of anatomical lesions. Associated congenital abnormalities were found in 28 of 105 cases in this series.

Studies in Gastro-Enteritis.

EDMUND D. COOPER (*Archives of Disease in Childhood*, December, 1937) has studied the clinical aspects of infantile diarrhoea, the chemical changes in the blood and the effect on these of intravenous administration of fluid, and the changes in water and chloride content of the tissues in infantile diarrhoea and in other conditions. Three hundred consecutive cases of diarrhoea and vomiting in children under two years of age admitted to the Royal Hospital for Sick Children, Glasgow, over a period of four years, were included in the series and were divided into two groups, acute infantile diarrhoea and vomiting, either severe or mild, and chronic infantile diarrhoea. The acute severe cases comprised cases of the type designated *cholera infantum*, and the acute mild type those in which the patients suffered from diarrhoea and vomiting of varying degree and severity, but in which the general systemic disturbances, such as fever, dehydration and toxæmia, were less pronounced than in the severe type. The chronic cases were those in which wasting with frequent attacks of gastro-intestinal disturbance occurred. This type is designated atresia by Marriott. Artificial feeding appeared to be the most important aetiological factor. The author states that dehydration, toxicity and cyanosis were three outstanding danger signs, and all the acutely ill patients showed one or more of these. Parenteral infection was present in 40% of the cases. *Otitis media* was by far the most common form of infection encountered, but broncho-

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pneumonia and pyuria, which occurred with comparative rarity, were the most fatal complications. The mortality rate varied inversely with the age and state of nutrition of the child. The value of administration of fluid in treatment is emphasized by the author. In his opinion it diminished the concentration of the blood, and thus, by lessening its viscosity, eased the circulation and promoted increased renal activity. He considers that this, together with the increased interchange between intravascular and extravascular fluids, facilitated the excretion of waste products, the accumulation of which almost inevitably led to acidosis and toxæmia. He states that blood transfusion, if it has a place in the treatment of infantile diarrhoea, is probably of the greatest value in chronic cases associated with malnutrition.

ORTHOPÆDIC SURGERY.

Treatment of Tuberculosis of Joints.
 J. G. JOHNSTONE (*The Journal of the Royal Institute of Public Health and Hygiene*, May, 1938) states that the mortality rate in tuberculosis of joints has been so reduced that arrest of the disease can be assured in 85% to 90% of cases. *Pari passu* the standard of achievement has become higher and maintenance or restoration of function and normal contour have become further objects of treatment. Early arrest of the tuberculous process is essential for the securing of good terminal function with limited deformity. Much progress has been made in recent years towards these ideals; the present paper is devoted to discussion of forms of treatment particularly applicable to bone and joint disease. Climatology has come to play an important part, and the author emphasizes the value of a low rainfall, a high percentage of hours of sunshine, a low humidity and infrequent and low ground mists in the district selected for treatment of such patients. He describes in detail the principles underlying the planning and construction of hospital wards and verandas, so as to ensure maximum exposure to fresh air and sunlight. In order to prevent acclimatization to any given locality, it is desirable to have one section of the hospital inland and another near the sea beach. The efficient use of the elements, light, air and water, independently or in combination, will raise the basal metabolic rate, but they must be employed with discretion in order to achieve this object. To secure the optimum effect it is not necessary to expose more than one-third of the body to sunlight; hence it is never necessary to neglect effective local immobilization of affected joints. Fair-haired and freckled patients require protection from the elements, just as those whose skins are darkly pigmented react unfavourably to enclosure in plaster of Paris.

Patients in an acute stage should be exposed to the open air with caution at first, and the very young, the very old and those with evidence of severe toxæmia or renal insufficiency may be rendered worse by casual exposure to the elements. For several months of the year exposure to artificial light is a very useful accessory method of treatment, of no value in tuberculous spondylitis and hip disease, but of value in tuberculosis of minor and more superficial joints, particularly with abscess and sinus formation. A quartz rod inserted into the sinus at each application of the mercury vapour lamp will promote rapid healing of a superficial sinus. Recalcification of bone is stimulated by a diet rich in vitamin D, and its production within the body is assisted by the action of ultra-violet rays round 3,000 Ångström units. Short courses of appropriate vaccines appear to promote recovery from secondary infections of sinuses. Local treatment aims at the arrest of activity by immobilization for an adequate time, and reduction of functional disability and deformity, as far as possible, by careful and conscientious supervision of posture in the position of election. The more efficiently these principles are employed, the greater will be their influence on the course of the disease. Immobilization exerts a greater influence upon the early cessation of extension of the tuberculous process and upon the securing of a good functional result than any other single mode of attack. The degree of limitation of movement to be imposed is greater in acute arthritis in major joints, and in the more mobile joints of the body, in the old and the very young and in the non-resistant type of lesion. Absence of clinical symptoms is not a reliable sign of quiescence, the only safe guide being the comparison of an X ray film with previous ones, made every three months. The original rigid immobilization should not be relaxed until the destructive process has been stationary for six months. Extension of bone erosion, in the author's opinion, is an indication for increased traction to supplement the rigid immobilization. When bone erosion has ceased to progress for some months, and in the absence of X ray or clinical evidence of further bone destruction for six months, immobilization may be reduced; but for the spine or hip continuous recumbent immobilization should be insisted upon, whatever the amount of bone or synovial involvement. The ambulatory stage must be permitted only with some form of walking or retentive splint, which must limit movement and in some cases limit weight-bearing. Ambulatory immobilization should be maintained for a period similar to that required for recumbency. It is an axiom that little bone destruction entails little disability or deformity. The commonest result of a tuberculous joint infection

is one of unsound ankylosis, children retaining a useful range of practical movement in more cases than adults. It is essential in all cases to maintain the affected joint or limb in that position during recumbent treatment, in which it will prove most useful should a stiff joint ensue. These positions and the optimum time for immobilization of various joints are described by the author. In regard to operative treatment, he adopts the rule that the older the patient, the greater is the justification for operative treatment. Spinal bone grafting is seldom now done in children; paraplegia in children, especially when it occurs early, generally disappears with efficient treatment. In adults operations are useful in a large proportion of cases. The author resorts to operative fixation of the hip in adults, and prefers the Hibbs extraarticular arthrodesis. He recommends excision of the knee and extraarticular fixation of the shoulder in older children and in adults at the termination of activity.

Epidermoid Carcinoma in Osteomyelitis.

J. H. HARRISON (*The American Journal of Cancer*, April, 1938) reports a case of epidermoid carcinoma occurring as a result of osteomyelitis. This was the only such end-result in 365 cases of osteomyelitis cared for at the surgical clinic of Peter Brent Brigham Hospital, in Boston, in twenty-two years. It illustrated the tendency to remain localized which has been reported in other such cases, and occurred in a woman, forty-seven years old, who had suffered from osteomyelitis of the left tibia for eighteen years, during which time the tibia had been fractured twice. Diagnosis was confirmed by biopsy and mid-thigh amputation was performed. She had two applications of deep X rays at intervals of two months, and two years after operation was in excellent condition, without any signs of recurrence, and had gained 27 kilograms in weight. The history of carcinoma developing in osteomyelitic foci is one of slow progression, and most authors consider that the condition is directly associated with the occurrence of mild inflammation repeated at frequent intervals for so long a time that it finally overtaxes the reparative processes of the injured tissues. The author has not found in the literature any instance of carcinoma secondary to osteomyelitis in which there were distant metastases; nearby lymphatic nodes showed only chronic lymphadenitis. In spite of this the process is locally malignant and may produce extreme cachexia, as it did in this patient. Benedict reported twelve instances of carcinoma occurring in a series of 2,400 cases of osteomyelitis. The time of duration of sinuses before malignant changes became manifest varied from ten to fifty years. The shortest time within which malignancy is known to have developed as a complication of osteomyelitis is one year after its onset.

British Medical Association News.

SCIENTIFIC.

A COMBINED MEETING of the New South Wales Branch of the British Medical Association with the Australian Chemical Institute was held at the invitation of the Australian Chemical Institute on May 18, 1938, in the Assembly Hall, Science House, Gloucester Street, Sydney. Mr. R. B. SCAMMELL, President of the Australian Chemical Institute, was in the chair.

Chemistry and Medicine.

Dr. A. S. WALKER read a paper entitled "Chemistry and Medicine" (see page 185).

Mr. R. B. SCAMMELL said that advances in medicine were the result of cooperation; the chemist could not claim all the credit. He hoped that the problem of idiosyncrasy would be solved in the near future by cooperation between the chemist and the doctor.

Dr. B. T. EDY, President of the New South Wales Branch of the British Medical Association, thanked the Australian Chemical Institute for the invitation, and hoped that this first occasion of a conjoint meeting would not be the last. The medical profession could not get on without the assistance of chemists; in fact, he wondered whether the position of the medical practitioner would not be undermined and whether his place in the community would be taken by the chemist. He visualized the time when the patient would be sent to the chemist to be analysed, and then sent on to another department to have any deficiencies made up. The advances made in chemistry in recent years had been overwhelming, and the medical profession found difficulty in keeping pace with the changes. He hoped that the chemist would clarify the situation as time went on. The medical practitioner was overwhelmed with literature and trade names; a thousand new drugs were introduced to the medical profession every year. A valuable service to the medical profession and to the community would be done if the problem was simplified. In conclusion, Dr. Edye stressed the necessity for a simple nomenclature.

Mr. R. W. CHALLINOR said that in the earlier days of the State there was only one scientific society, the Royal Society of New South Wales, which catered for the reading of papers on medicine, engineering, chemistry and all other branches of science. Since then evolution had taken place, and many different specialized societies had been formed, but they were now coming together again. This was one way in which progress was made. Some conjoint meetings of the Australian Chemical Institute with the engineers, architects and the legal profession had been held, because the influences of chemistry extended into most industries and callings, and, as Dr. Walker had pointed out, it entered to a great extent into medicine. Dr. Walker had shown a great knowledge of organic chemistry, and was obviously keeping closely in touch with the chemistry of the benzene ring and of the sterols. Such specialized knowledge was necessary at the present time. Mr. Challinor hoped that further conjoint meetings of the two associations would be held. He said that he would like at least one meeting of the Australian Chemical Institute with the British Medical Association to be in the form of a symposium on some chosen subject. Great advances were being made in knowledge, and much was to be gained by cooperation.

Dr. R. K. MURPHY said that a biochemical group had recently been formed; at its meetings members had an opportunity of discussing problems of interest to the medical profession, whose members should be invited to attend its meetings. Both sides would benefit materially, and a meeting of that type could go a long way towards assisting both professions and the general public. Dr. Walker had made generous remarks about the debt of the medical profession to chemists; Dr. Murphy wished to return the compliment. The willingness of the medical

profession to experiment and make their findings known gave the chemist a lead to study the chemical aspect. The broad-minded medical man, who was willing and leisureed enough to experiment, had given many chemists an opportunity of doing work that they would not otherwise have been able to tackle. Dr. Edye, in his comments on the multiplicity of chemicals, had been only partly correct; the situation was embarrassing not only to the medical profession but to chemists as well. To such an extent was this true that an international committee had had to be appointed to study nomenclature, and German and French committees had been working also, and correlation would ultimately be achieved. Trade names were difficult to remember, for the chemist as well as for the medical practitioner. The suggestion had been put forward that, although chemical names might be very long and apparently involved, it was on the whole easier to learn these names and use them than to memorize 10,000 trade names. Dr. Murphy further said that although medicine might become more chemical or the chemist might become more medical, the medical profession had no need to worry; it should be possible for the two professions to cooperate. Moreover, there was nothing to replace a good bedside manner. The medical man could never be completely replaced by the chemist. The problem of dental caries was closely related to the problem of diet. Could diet really correct dental caries, or was the condition due purely to prenatal influences? Wide publicity was given to tooth-pastes *et cetera*; most claims were exaggerated. Dr. Murphy did not wish to imply that people should not use tooth-paste; but he wondered whether the problem of dental caries could be solved chemically, by means of diet.

Dr. Walker, in reply to Dr. Murphy, said that there was very little evidence that gross structural damage in a tooth could be repaired once it had taken place. The formation of both sets of teeth, even the second set, took place very early. This was strikingly illustrated in an X ray film of the head of a young child; a great crowd of teeth could be seen even long before eruption had occurred. Some reports of improvement had been made as the result of the use of certain diets and with high dosage of certain vitamins; but these had not been substantiated. The teeth could be improved, but once decay had occurred repair was impossible. Dr. Walker thought that the use of tooth-paste was to be recommended on hygienic and social grounds.

Dr. Walker referred again to the debt of medicine to chemistry, and said that there were not only chemists, but also medical chemists. The medical practitioner would never be entirely undermined by the chemist, because there would always be the need for the scientific evaluation of symptoms. He was glad that the meeting had been arranged. He was in agreement with Mr. Challinor's suggestion that specific subjects should be chosen for discussion at future conjoint meetings.

Dr. E. S. MORRIS said that not all medical practitioners were so conversant with the chemical side of life as Dr. Walker; the average medical man soon forgot the small amount of chemistry he once learned. It was unfortunate, but true. The medical man gained much of his knowledge of chemistry from the blotting pads that reached him by every mail. In discussing dietetics, Dr. Morris said that he was amazed at the facility with which the chemists gullied the public into the belief that certain elements were essential foods. For example, there was the "roughage" fad, which was at present on the wane; but some time previously no one could get enough "roughage". People stored it up in themselves until they were filled with wind and self-righteousness. Dr. Morris said that in his official capacity he had a great deal of trouble in keeping pace with the industrial chemists, because they always seemed to be one or two steps ahead of his organization. As soon as he had succeeded in having a food or drug standardized under the *Pure Food Act*, an ingenious chemist invented some new departure which, though providing a cheaper substitute, might be detrimental to the public interest. Dr. Morris mentioned milk fever in cattle, saying that an affected cow died paralysed

unless the udder was pumped up with air. It was always the heaviest milker that was most likely to be affected. This was because the cow secreting the most milk required a full blood supply to the udder, and her body became temporarily drained of calcium. If the sudden drain of calcium was not stopped by the blood's being forced out of the udder, the animal died in tetany. The cure of this condition had somehow been arrived at long before the biochemical factors underlying it were understood. Dr. Morris said that chemistry had not much hope of completely superseding medicine. He fully expected, however, that one day some genius of a chemist would discover how to make babies in test-tubes, and he could only view that prospect with apprehension. Dr. Walker had surveyed the field in a very admirable way, and had given evidence of a knowledge of chemistry much greater than that of most medical men. He was proud of the fact that Dr. Walker was a member of the profession, and that he had made such an excellent job of his task.

PROFESSOR J. C. EARL said that from the chemical side Dr. Walker had given an admirable survey of his subject and had chosen the right aspects. The debt of medicine to chemistry was paralleled by the debt of chemistry to medicine. It had been said that research should be conducted without any thought of the ultimate result; but there was not a doubt that it encouraged a worker if he knew that something of value would come from his work. Professor Earl mentioned instances in which the demands of medical science had been of great value in directing the course of chemical investigation. He mentioned particularly the microanalytical methods of Pregl. Professor Earl said that for some years he had been engaged in the task of trying to instil some knowledge of chemistry into medical students; but at the early stage of the medical course, at which chemistry was a subject, its significance and value in later study were not realized by the student. Chemistry would ultimately have to fill a larger place in the medical curriculum. Dr. Walker had given chemists a number of things to think about.

A MEETING of the South Australian Branch of the British Medical Association was held on April 28, 1938, at Adelaide, Dr. R. E. MAGAREY, the President, in the chair.

Eye Injuries and Disorders.

DR. BRIAN MOORE read a paper entitled "Some Common Eye Injuries and Disorders" (see page 191).

DR. A. L. TOSTEVIN, in opening the discussion, said that although in South Australia medical students were fortunate enough to have ophthalmology included in their final examinations, it still appeared to be the most remote of the specialties from the point of view of the general practitioner. Nevertheless, many simple eye conditions must come under his care, especially in the country. Dr. Moore had left little to say in regard to such conditions. Dr. Tostevin said that he would briefly mention some of the lesions which came under the care of the general practitioner and about which he still had some doubt.

Dr. Tostevin said that he would never try to remove a foreign body from an eye without putting the patient on a table and having a loup and good illumination. He always used 1% "Decicain" solution ("Pantocain") as an anaesthetic. If the foreign body was central, considerable loss of vision could occur from any resulting corneal scar. This risk could be minimized only by removal of the foreign body under proper conditions, which were easily available to all. After the removal it was very important to bandage the eye firmly so that the lids did not move under the dressing. Dr. Tostevin impressed upon those present the necessity for an X ray film to determine the presence of any intraocular foreign body in the eyes of patients giving a history of having used a hammer in stone or metal work.

It was surprising how many corneal ulcers were still seen which were secondary to some other condition, such as an eyelash or foreign body under a lid, a diseased

lachrymal sac *et cetera*. Every case of corneal ulcer should be thoroughly investigated for a cause and, if possible, for removal of the cause.

Traumatic hyphæmia was rapidly on the increase and needed special mention. There was a rule in Dr. Tostevin's clinic at the hospital that all persons suffering from traumatic hyphæmia were to be admitted to hospital until the lesion disappeared. No miotic or mydriatic was allowed, because three cases of secondary haemorrhage had occurred following the use of a mydriatic. This was supposedly due to the movement of the ciliary body, from which Dr. Tostevin considered that these secondary haemorrhages occurred. A mydriatic served no good purpose, and therefore there was no justification for its use. The tension of an eye with hyphæmia should never be felt. If the tension was raised, this would soon be known without palpation.

Dr. Tostevin agreed with Dr. Moore in his use of perchloride of mercury in glycerine for trachoma. He had used it with great success for several years. In addition he had recently had excellent results from the internal administration of "Halliol". He had always regarded trachoma as being due to a deficiency as well as to an infective factor, and elimination of the former had worked wonders in acute cases at the Adelaide Hospital.

Dr. Tostevin, speaking of squint, said that he wished to emphasize Dr. Moore's remarks in regard to the early treatment of children with a squint.

In acute conjunctivitis Dr. Tostevin used a non-irritating solution for drops, such as a 1 in 2,000 solution of methyl violet, frequent bathing with a 1 in 10,000 solution of perchloride of mercury, and a mercurial ointment. He found zinc sulphate rather too painful; and there was no doubt about the excellent bactericidal properties of methyl violet and "Metaphen". Dr. Tostevin said that he wished to mention the treatment of *ophthalmia neonatorum*. Protein shock therapy was meeting with phenomenal success, so much so that it should be known to all, since everyone was beginning to realize its even greater importance than that of the local treatment. Gonococcal conjunctivitis in the adult had formerly usually ended in tragedy; but eyes were being saved by persistent raising of the patient's temperature. The same method of attack could be dramatic in its effects on iritis, episcleritis and even acute ulceration of the cornea.

In these days of efficient and cheap ophthalmoscopes it was hardly necessary for Dr. Tostevin to call attention to the necessity of excluding glaucoma before telling a patient that he had cataract. Even the pupillary reactions could be a guide, as any loss of field of vision in glaucoma meant a corresponding loss of pupillary activity to light. Dr. Tostevin concluded his remarks with a plea for a greater use of the ophthalmoscope by the general practitioner. It was surprising how often examination of the fundus would yield facts relative to some obscure general medical condition.

DR. J. R. CORNISH stated that in modern industries corrosives and molten metals caused many of the injuries to the eyes; these were exceedingly painful; even hypodermic injections of morphine sometimes failed to relieve the patient. He asked the speakers whether any detrimental effect would follow the repeated instillation of local anaesthetic until the patient received the necessary special treatment.

A MEETING of the Victorian Branch of the British Medical Association was held on April 20, 1938, at the Austin Hospital for Cancer and Chronic Diseases, Heidelberg. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the Austin Hospital.

Diagnosis of Glandular Swellings.

DR. ERIC L. COOPER showed several patients, and also skiagrams, specimens and microscopic slides of glandular swellings; he discussed the differential diagnosis of glandular masses in the neck, mediastinum and abdomen.

Hodgkin's Disease.

Four of the patients shown by Dr. Cooper were suffering from Hodgkin's disease. The first patient, aged sixty-nine years, had had painless swelling of the glands in the neck, axillæ and groins for eight months. It could be seen in the skiagrams that the mediastinal shadow was wide. The diagnosis had been established by means of a biopsy examination. The blood picture was that of hyperchromic anaemia, the haemoglobin value being 72% (Sahli), the erythrocytes numbering 3,610,000 per cubic millimetre, and the colour index being 1.1. The leucocytes were estimated at 6,600 per cubic millimetre, 44% being lymphocytes. The enlargement of the glands had subsided under deep X ray therapy, and a mixture containing iron and arsenic had been used as an adjuvant.

Dr. Cooper's next patient, a man, aged twenty-six years, had had enlarged cervical glands for two years and kyphosis and pain in the neck for one and a half years; a mass was present over the sternum. Dr. Cooper demonstrated from the skiagrams consolidation extending from the left hilum and a destructive lesion of vertebrae in the lower cervical region and the lower dorsal region. The diagnosis of Hodgkin's disease was confirmed by biopsy examination. The infiltration of the bones of the vertebral column was associated with paraplegia, and blood examination revealed that a state of hypochromic anaemia was present. The estimate of the haemoglobin was 65%, the erythrocytes numbered 4,410,000 per cubic millimetre, and the colour index was 0.75. Leucocytes numbered 16,600 per cubic millimetre of blood. Dr. Cooper said that the patient had had some deep X ray therapy.

The third patient shown by Dr. Cooper was a married woman, aged sixty-eight years, who had attended the out-patient department at the Alfred Hospital in January, 1935, with the history of lumps in the left groin that had been present for two months, followed by similar lumps in the right groin. A hard fixed mass had then been felt in the left iliac fossa and a gland had been excised for biopsy; but the section had been mislaid. During 1937 the patient had frequent exposures to deep X rays to the groins and abdomen. The lumps in the groins had disappeared, but the patient had become weaker; jaundice had been noted a few months before the meeting. The jaundice had continued and the liver was found to be enlarged, with a firm round edge. There were a few enlarged glands on the right side of the neck; but apart from enlargement of the mediastinal glands no abnormal appearances had been seen on radiographic examination of the chest.

Dr. Cooper's fourth patient was a man, aged forty-four years, who had attended the Royal Melbourne Hospital in January, 1928, with a history of a lump in the left side of the neck of two years' duration, of several lumps on the right side of the neck of twelve months' duration, and of glandular enlargements in the axillæ and groins of nine months' duration. A section of a gland removed at biopsy was reported as Hodgkin's disease. The patient was admitted to hospital on March 3, 1938, with considerable enlargement of lymph glands in the neck, axillæ and groins; the spleen was palpable. Evidences of glandular enlargement in the left, middle and right lower mediastinal areas could be seen in the skiagrams of the chest, together with patchy consolidation and dulness in the lower half of the right lung and slightly towards the left base. The appearances were consistent with the diagnosis of Hodgkin's disease. The erythrocytes numbered 4,110,000 and the leucocytes 21,800 per cubic millimetre of blood, and the presence of a slight eosinophilia was noted in a blood film.

Mesenteric Adenitis.

Dr. Cooper next showed two patients, both female, and each aged eighteen years, suffering from enlargement of the mesenteric glands, which was suspected to be tuberculous in origin.

The first patient had suffered from tiredness and lassitude for twelve months, and had some indigestion, with "belching of wind" and nausea after meals, for three

months. The tonsils had been removed six months before the meeting. She had also had vague pains in the back, especially under the right scapula, and occasional attacks of mild colicky abdominal pain followed by diarrhoea. Examination of the heart and lungs had been carried out carefully with negative findings, except that the left hilar shadow was somewhat enlarged. No tubercle bacilli had been found in the sputum or in the urine. The erythrocytes numbered 4,500,000 and the leucocytes 9,800 per cubic millimetre; the haemoglobin value was 80%, the colour index was 0.9, and the blood film was normal in appearance.

The other patient had been admitted to the Austin Hospital for Cancer and Chronic Disease from the Royal Melbourne Hospital on April 8, 1938, with a history that one month earlier generalized colicky abdominal pain, followed by vomiting and diarrhoea, had occurred. Four days after the onset the pain moved to the right iliac fossa, and at laparotomy, performed at the Royal Melbourne Hospital, massive infection of the glands throughout the mesentery was found to be present. At the Austin Hospital the lower part of the abdomen was slightly protuberant, and an indefinite knobby mass was palpable in the right iliac fossa.

Malignant Disease of Glands.

Dr. Cooper also showed three male patients suffering from varieties of malignant disease affecting glands.

The first patient, aged seventy years, had had a swelling in the left groin for six months and had also had enlargement of glands in the neck and right axilla and had difficulty in swallowing. Material removed at biopsy had been examined, and the sections had been reported on as lymphosarcomatous. Infiltration from the hilum into the right lung with pleural effusion was demonstrable in the skiagrams of the chest. The patient was undergoing deep X ray therapy.

The second patient, aged sixty-one years, had been admitted to the Austin Hospital for Cancer and Chronic Diseases on March 25, 1938, with a history of epigastric pain of three months' duration; it was worse after meals and was becoming severe and continuous. The pain extended through to the back and the patient had lost 6.5 kilograms (one stone) in weight. At the Royal Melbourne Hospital laparotomy had been performed, and a large stony retroperitoneal mass had been found; it was regarded as a lymphosarcoma. At the meeting a hard fixed mass could be felt in the epigastrium.

Dr. Cooper's other patient, a man, aged sixty years, had had a mass on the right side of the neck for twelve months, with slight pain on swallowing. He also had a cataract in the right eye. On laryngoscopic examination a small ulcer was found in the right pyriform fossa, extending to the pharyngeal wall. The condition was regarded as a primary epidermoid carcinoma in the pyriform fossa, with secondary carcinoma in the glands of the neck.

Interstitial Keratitis.

Dr. W. J. LAWRENCE DUNCAN showed two female patients suffering from interstitial keratitis, with the object of drawing attention to the fact that occasionally the condition was tuberculous in origin.

The first patient, who was aged twenty years, had the characteristic interstitial keratitis, associated with congenital syphilis. She had come under Dr. Duncan's care at the onset of the condition, three weeks before the meeting. Her blood serum gave a strongly positive reaction to the Wassermann test.

The other patient, who was aged twenty-five years, had attended at the Eye and Ear Hospital from November 8, 1937, on account of bilateral iridocyclitis with pronounced evidence of *keratitis punctata*. The blood serum had failed to react to the Wassermann test, and the Verne index was 24. The paranasal sinuses, after investigation, were regarded as normal. For two months before the meeting infiltration had progressed into the *substantia propria* of the cornea of each eye, so that the condition was an interstitial keratitis. At the age of thirteen years the

patient had had an abscess in the right side of the neck, and the surgeon who had incised it had said that it was a tuberculous abscess. The patient had been treated with ultra-violet radiation of the neck and chest during the ensuing twelve months. At the age of nineteen years two lymph glands, which were said to be tuberculous, were removed from the right side of the neck. At the age of twenty-four years the patient had become debilitated. The chest had been examined radiographically at Saint Vincent's Hospital, but the skiagrams were not considered to be abnormal in appearance. At the age of twenty-five years her eyes had become bloodshot and vision had begun to fail. The hilar glands were reported to be enlarged after fluoroscopic examination. The patient was having deep X ray treatment at the Royal Melbourne Hospital.

Rodent Ulcers of the Face.

Dr. Duncan also showed two elderly men with rodent ulceration affecting the orbit. The first patient, a man aged sixty-seven years, had suffered from recurrent rodent ulceration of the face and neck for twenty years. He had had many courses of deep X ray therapy, radium therapy and diathermy. On October 31, 1934, Dr. Hugh Trumble had removed the right eye, together with the upper half of the nose.

The other patient, a man, aged seventy-three years, had been admitted to the Austin Hospital on November 19, 1934, with a history of ulceration of the right orbit since 1921. He had been treated with radium at Saint Vincent's Hospital on several occasions between 1921 and 1924, and again at the Royal Melbourne Hospital in 1928. The eye was removed at the Royal Melbourne Hospital in 1932. At the meeting Dr. Duncan demonstrated the presence of an enormous rodent ulcer.

Tuberculous Disease of the Larynx.

Dr. NORMAN EADIE showed four patients with tuberculous disease of the larynx, varying in site and stage of progression, to illustrate the applicability of different methods of treatment.

Radiography.

Dr. ALAN MACKAY showed a number of skiagrams to illustrate various pathological conditions and the results of X ray therapy. Dr. Mackay first showed skiagrams of a female patient, aged thirty-two years, who had sustained a fracture of the neck of the left femur on July 30, 1935. Absorption of the upper end of the femur suggestive of malignant changes was shown in a skiagram prepared on January 16, 1936. Other films prepared three months later were used to show that there were some union in the fractured neck and erosion of the medial border of the upper third of the femur. After a large dosage of deep therapy, recalcification and sclerosis had taken place in the areas involved. Calcui were present in the left kidney. In May, 1937, the patient had fractured the neck of the other femur, and Dr. Mackay showed in skiagrams evidence of *osteitis fibrosa cystica*; at that stage the blood calcium content was estimated at 19.0 milligrammes per hundred cubic centimetres of blood. Both fractures united firmly, and while she was having deep X ray therapy the patient appeared to be reasonably well. Dr. Mackay showed recent skiagrams revealing the changes of fibrocystic disease involving the skull, scapulae, ribs and pelvis. He stated that on April 9, 1938, the blood calcium content had been estimated at 18.5 milligrammes per hundred cubic centimetres of blood.

Dr. Mackay next showed skiagrams of a male patient, aged forty-three years, who had been suffering from intractable asthma for five years. In January, 1938, both antra were completely occluded by thickened mucosa. A course of deep X ray therapy had been given, and Dr. Mackay showed in skiagrams made two months later that the mucosal thickening had been considerably reduced. Concurrently there had been a considerable decrease in the amount of sputum and an improvement in the patient's condition.

In skiagrams of the lumbar part of the spine of a male patient, aged forty-eight years, and of the shoulder of a female patient, aged fifty-five years, Dr. Mackay showed the changes of Charcot's disease, consisting of gross disorganization of the involved joints, together with fragmentation and some hypertrophic regeneration of the bone. Both patients had had the signs and symptoms of *tabes dorsalis* for some years, and their serum had reacted to the Wassermann test.

In skiagrams of several patients with osteogenic sarcoma in long bones, and of a patient with chronic osteomyelitis of both femoral shafts, Dr. Mackay showed the contrast in appearance of the two conditions. In the patient with osteomyelitis the appearance of portion of one femur was strongly suggestive of sarcoma, with new bone formation at right angles to the shaft; however, at operation for removal of the sequestrum it had been found that the condition at that area was due to chronic osteomyelitis, the new bone formation being the result of infection.

In other skiagrams Dr. Mackay showed the presence of various pulmonary and osseous metastases from primary growths; in each instance the primary growth had been undiscoverable before death, but at autopsy primary suprarenal neuroblastomata and renal neoplasms had been found.

Neurological Conditions.

Dr. E. GRAEME ROBERTSON showed two patients and a pathological specimen. The three cases will be reported in full in a later issue of the journal.

Surgery for Tuberculous Diseases.

Dr. HUGH C. TRUMBLE showed a number of patients to illustrate the late results obtained in the treatment of tuberculosis of the spine and hip. In general, treatment had been along conservative lines until the patient gained control of the disease, and appeared to be in good health. Then, as a rule, permanent fixation of the diseased part was attempted by the insertion of a bone graft. In the case of patients with hip disease grafting was performed after the technique described by him in *The Australian and New Zealand Journal of Surgery* for March, 1932. Skiagrams were shown to illustrate that the grafts fused well and underwent great hypertrophy in the years after operation. In several cases osseous union at the hip took place. One patient fell down a flight of stairs and fractured the graft. Union promptly took place again. The method had proved to be very successful and free from complications in a series of twelve consecutive cases. Most of the patients in the series were well several years after operation, with no evidence of activity of the original disease at the hip joint.

Dr. Trumble stated that he had recently resorted to grafting in patients with spinal tuberculosis, unless some contraindication was present. In all cases prolonged rest in a plaster bed, until the disease was brought under control, preceded operation. Usually the operation performed was of the type described by Albee, but sometimes, especially in disease of the thoracic part of the spine, the type of operation described by Hibbs was used. When the patients were eventually allowed up, no jackets were used. Several patients were shown who were well years after discharge from hospital and able to work at various occupations. Dr. Trumble showed in a series of skiagrams the state of the spine and graft in each case.

Dr. Trumble also showed a number of patients with pulmonary tuberculosis, in the treatment of which surgical collapse therapy had been undertaken. These patients had remained well, and several were able to lead quite active lives. The question of selection of cases was discussed, and Dr. Trumble showed a series of radiographs taken at intervals before and after operation. Sometimes operation had been undertaken in spite of the fact that the state of the patient did not seem to be quite satisfactory. At times there was no improvement, and occasionally the patient became worse; but on the other hand some patients whose future had seemed to be quite hopeless had been granted a new lease of life.

Pneumothorax.

DR. CLIVE FITTS gave a lecture and demonstration from lantern slides, in which he outlined numerous points of interest in connexion with pneumothorax, spontaneous and artificial.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Duval, Robert Andrew, M.B., B.S., 1938 (Univ. Sydney),
Royal Prince Alfred Hospital, Camperdown.

The undermentioned has applied for election as a member of the Victorian Branch of the British Medical Association:
Lavery, John Anthony Ernest Arthur, L.R.C.P.,
L.R.C.S. (Edinburgh), L.F.P.S.G., Meenyan.

Post-Graduate Work.**LECTURES IN SYDNEY BY DR. W. B. CASTLE.**

THE New South Wales Post-Graduate Committee in Medicine, by arrangement with the Melbourne Permanent Post-Graduate Committee, has invited Dr. W. B. Castle, of the Thorndyke Memorial Laboratories, the Boston City Hospital, Massachusetts, United States of America, to give two lectures and one demonstration in Sydney, as follows:

Tuesday, August 9, 1938, at the Robert H. Todd Assembly Hall, 135, Macquarie Street, Sydney, at 4.30 p.m.: "The Anæmias".

Thursday, August 11, 1938, at the Robert H. Todd Assembly Hall, 135, Macquarie Street, Sydney, at 4.30 p.m.: "Nutritional Deficiency Anæmia".

Friday, August 12, 1938, at the Prince Henry Hospital, at 3 p.m.: demonstration of cases.

The fee for the whole course will be £1 1s., or for a single lecture or the demonstration only 10s. 6d. Tickets may be obtained from the Secretary, New South Wales Post-Graduate Committee in Medicine, The University of Sydney, or from the Honorary Secretary, 225, Macquarie Street, Sydney.

WEEK-END COURSE AT LISMORE.

THE New South Wales Post-Graduate Committee in Medicine announces that, in conjunction with the North-Eastern Medical Association, it will hold a week-end course at Lismore on Saturday, August 20, and Sunday, August 21, 1938. The programme is as follows.

Saturday, August 20, 1938.*At the Canberra Hotel, Lismore.*

2 p.m.—General meeting of the North-Eastern Medical Association.

4 p.m.—Afternoon tea and registration for the course.

4.15 p.m.—Lecture by Dr. B. T. Edye: "Some Observations on the Surgery of the Gall-Bladder".

7 p.m.—Official dinner.

8 p.m.—Lecture by Dr. C. G. McDonald: "Modern Views on Medical Disorders of Liver Function".

Sunday, August 21, 1938.*At the Lismore Base Hospital.*

9 a.m.—Demonstration of medical cases by Dr. C. G. McDonald.

11 a.m.—Morning tea.

11.15 a.m.—Lecture by Dr. B. T. Edye: "The Present Position of Surgery in the Treatment of Peptic Ulcer".

At Saint Vincent's Hospital.

2 p.m.—Demonstration of surgical cases by Dr. B. T. Edye.
4 p.m.—Afternoon tea.

4.15 p.m.—Lecture by Dr. C. G. McDonald: "Vascular Diseases in General Practice".

The fee for the course will be one guinea. Those intending to be present at the course are requested to notify Dr. J. B. Oakeshott, Lismore, as soon as possible, also to state whether it is their intention to be present at the dinner.

COURSE IN OPHTHALMOLOGY.

THE New South Wales Post-Graduate Committee in Medicine, in conjunction with the Ophthalmological Society of New South Wales, will hold a special course in ophthalmology at Sydney during the fortnight commencing October 31, 1938. Lectures will be given during the mornings and demonstrations during the afternoons.

The course is designed mainly to give tuition in ophthalmology in relation to general practice, emphasizing *inter alia* the relationship existing between general diseases and their manifestations in the eye, and the significance of ocular conditions as a guide to systemic disease. Sight testing will not be dealt with and instructions in operations upon the eye will not be included in the course.

The number attending this course will be limited to fifteen. Registration will be made in order of application until this number is received.

The fee for the course will be £5 5s. Application should be made (with cheque enclosed) to the Secretary, New South Wales Post-Graduate Committee in Medicine, The University of Sydney.

Correspondence.**THE CONTACT LENS.**

SIR: I have read an article in your issue of July 16, 1938, by Dr. J. D. Maude, on the subject of contact lenses.

Any information on methods of technique, or new methods of technique, is of interest to those practising ophthalmology.

For many years I personally have used Zeiss's contact lenses, in which there are multiple ready-made fittings, which one tries on the patient, and one adds the necessary spherical correction when one has secured the best fitting. The cost of these lenses is £5 5s. They have not been entirely satisfactory. Thirty per centum, or over, can wear them continuously with entire comfort; about another thirty per centum can wear them about half the time, so that, in cases where they are necessary in each eye, they can use one eye for about three hours and then the other eye *et cetera*. The rest have difficulty in wearing them at all, owing to their producing irritation.

One has been conscious that it was not an ideal form of correcting errors, so it has only been used in those cases, such as keratoconus, where it is not possible to secure sufficient improvement by the wearing of ordinary spectacles. For this reason the ophthalmic community generally has been endeavouring for many years to secure a more efficient method of manufacture.

A man named Dallos, who is employed by Hamblin's, has evolved a technique of personally fitting each patient instead of relying on the nearest ready-made fitting as a base. Being interested in the subject, I have had very extensive inquiries and investigations made by my son, Dr. John Antill Pockley, who has been in London for the last eighteen months. For the benefit of those interested I am offering the comments he has made in his own words.

His first letter was written some months ago; the last was written on June 29 last. From the first letter I quote:

With regard to contact lenses, as it was found that few people could wear the old contact lenses for any length of time without irritation, a man who is employed by Hamblin's here developed a technique of grinding lenses to fit the patient from casts made of the front of the eye, and, when the rough lens was obtained, fitting it to the patient by slit-lamp control with repeated grinding of the lens until it could be worn as a perfect fit.

The process is horribly intricate and expensive, but the people who are fitted can wear the glasses all the time in most cases, with perfect comfort. There have been quite a number of cases shown in the various hospitals to prove it.

Corneal dystrophies and weak scars improve wonderfully as the nutrition of the cornea is so improved. Also aphakics can use both eyes together, and for young people, who have lost one lens, this is a real benefit. However, the expense, difficulty of the technique, and enormous time taken precludes any men who have any work to do from taking it on; also it is just about a monopoly for Hamblin's.

After some months' further investigation he writes as follows:

The position as regards contact lenses remains very much the same. . . . have with some others put money into the concern, and are trying hard to make the thing go. A large part of the problem is the difficulty of getting any medical men to take the thing up as a full time job, and learn the technique of grinding the lenses. Dallos, the Continental originator of the idea, who brought it to London and got Hamblin's to take it up, is still the only man who can do the whole process with any degree of success. There is another man . . . who is learning how to do it, but has not got very far with it, and Dallos still does the final and all-important fitting in every case. . . . in combination with other firms of opticians went through a period of intense activity and issued a lot of literature, tending to show that they were going to offer some opposition to Hamblin's, but it has all lapsed, owing to doubt about the future of the business, and expense involved, and allegedly the impossibility of getting anyone to equal Dallos in making the lenses.

There seems no doubt about the efficacy of the lenses as compared to Zeiss lenses, but they cannot always be fitted properly, as a more spongy conjunctiva than usual can upset the fit. The most dramatic results are obtained with corneal dystrophies and irregular astigmatism. Ulcers following mustard gas and herpes usually improve rapidly with them, but acne keratitis does not respond as well.

The original forecast that people with only moderate degrees of myopia would wear them constantly does not seem to have been borne out, as the patients find them sufficiently uncomfortable to prefer glasses.

As the expense of manufacturing and fitting them is so great, it requires a city with a population as great as London to be tried at all, and Australia will probably not see them at all until or if they become a real going concern here.

One of the factors in the development of contact lenses is that . . . will have a monopoly if it proves itself, and they are never inclined to spare the price. At the moment it costs a private patient something in the nature of £50 a lens, but there is a scheme which subsidises public hospital patients for about £12. Needless to say they are not ordered unless the indications are pretty strong. The technique of making the lenses consists essentially in taking the cast of the cornea and sclera anteriorly, and first grinding a lens to fit it, and then touching it up after slit-lamp observation on the patient.

The reason they are so keen to get a medical man other than trained technicians is the extreme frequency

of trauma to the cornea in getting the lens off and on so frequently in the final stages. It will of course be years before it is all worked out.

This concludes his remarks in his second letter. From this it appears to me that the new process, while having certain advantages over the old, is as yet in the very elementary and almost experimental stage.

It is obvious that the mere making of a cast of the eye is insufficient to secure accurate fitting, and that repeated fittings and grindings by technicians under slit-lamp observation are necessary.

It is my sincere hope that this extremely intricate work will be learnt by a large number of technicians, and that the cost involved will be considerably reduced. In any case it looks as if the optician will be a much more important individual than the ophthalmic surgeon concerned in most cases.

It is possible that in the future some ophthalmic surgeons may find there is scope for their activities in confining them to this subject, learning to become mechanics and technicians, and performing to some extent the functions at present relegated to the opticians.

Yours, etc.,

F. GUY ANTILL POCKLEY.

233, Macquarie Street,
Sydney,
July 20, 1938.

DR. W. J. PENFOLD.

SIR: May I add my tribute to Dr. W. J. Penfold on his retirement. Professor Duhig has written of his eminence as a bacteriologist, but I would speak on a more personal note.

I have known Dr. Penfold ever since he became the Director of the Baker Institute. Many times since then he has helped me—and many others too—with his devastating and yet kind criticism.

Though it is a far call from his specialty to mine, I know that his opinion on my work will always be sound and scientifically reasoned. Many others besides myself have had his help in various branches of medicine and surgery.

Dr. Penfold has never been the aloof "Director of a Research Institute". Thus his personal influence and love for scientific truth have extended far beyond the Baker Institute itself. I feel it has been my great good fortune to know him.

Yours, etc.,

T. A'B. TRAVERS.

81, Collins Street,
Melbourne,
July 21, 1938.

THE TREATMENT OF CANCER OF THE CERVIX UTERI.

SIR: Drs. H. H. Schlink and C. L. Chapman are to be highly commended for the organization and attention to detail which is behind their paper (THE MEDICAL JOURNAL OF AUSTRALIA, July 16, 1938) on "The Treatment of Cancer of the Cervix Uteri", and also on their phenomenally low operative mortality in their surgically treated cases.

There are a few points, however, which I would put forward as legitimate criticism:

1. It is unfair to include a table of analysis of the relative cure rate of surgery (either alone or with radium) compared with radium alone, as the distribution of the cases in the various stages of the disease is so entirely different in the two groups. In the fifty-one cases treated surgically there are (as one would expect) 72.5% in stages I and II, the remaining 27.5% in stage III. In the fifty-two cases treated with radium only, 13.5% are in stages I and II, whereas 86.5% are in stages III and

IV, that is, are advanced cases. Furthermore, surgical statistica are presented without the omission of one case, whereas thirteen radium cases have been lost sight of (three of these being in stages I and II).

2. The authors have drawn attention to the need for careful grouping of the cases into stages. I would like to ask them whether in the case of a stage II case (graded on clinical examination) which at operation has shown metastases in the pelvic glands, the stage has been changed by them to stage III. The general rules to be observed in following the definitions of the League of Nations grading expressly state:

The stage of each case should be decided at examination prior to treatment, and this classification should remain. The classification may be postponed quite exceptionally, and the reasons stated.

Neglect of this rule will, of course, give a surgeon an unfair advantage over the radiotherapist, who includes in his stage I and II cases many which at operation would prove to be stage III.

3. I object to the bald statements, "our microscopic experience has proved that radiotherapy makes no impression whatever on lymphatic metastases", and again, "radium is not a cure". Radiotherapists have been alive to the possibility for some years that radium alone may not deal with pelvic gland metastases, since the intensity of radiation falls very rapidly as the pelvic wall is approached. Hence the advocacy throughout the world for some form of external irradiation, either deep X rays or the radium bomb, which will deliver a further dose to the parametria and pelvic glands beyond the zone of effect by radium applied to the cervix.

I have before me figures for five-year survival in inoperable cases of cancer of the cervix from fifteen leading radiation centres in various countries, covering in all 5,611 cases. These figures vary from 9.6% to 25%. Would Drs. Schlink and Chapman be prepared to state that none of these survivors had pelvic gland metastases?

It is generally accepted that the degree of any biological effect from irradiation is proportional to the dose, and the approximate lethal doses have been worked out for some forms of carcinoma in units of quantity of radiation. Can the authors inform me what doses (approximately in international r) the glands which showed no effect from radiotherapy in their cases received? Without correlation with dose, the observation of the non-disappearance of malignancy microscopically is of little scientific value. All one can say is that in their cases, with their technique, the glands were not affected. Unless a certain minimum dose is given to the glands no result can be expected.

Doses in the pelvis can be worked out for both radium and deep X ray applications, but collaboration with the radiotherapist and physicist is essential. Notable work has been done on dosage distribution in the female pelvis by Quimby, Arneson, our Australian physicist, Oddie, and others.

Contard reports on seventy stage III cases and extensive post-operative recurrences treated from 1923 to 1927 by deep X ray therapy alone or associated with radium, and gives a five-year survival rate of 28%. He reports one case of post-operative recurrence with extensive parametrial involvement alive and well for eight years after deep X ray therapy alone.

Regaud's figures for five-year survival in all cases of cancer of the cervix uteri rose from 24% in 1927 to 33% in 1933, due to the supplementary use of X rays. Was not this improvement probably due to the added dose on the pelvic wall?

4. The authors' five-year results of 62.5% in operable cases are excellent, and they are to be warmly congratulated. Wintz, the Marie Curie Hospital, and Hartmann have given figures which exceed this, the former recording 68% five-year survivals; and Laborde, Crossen, Schmitz, Burnam and Regaud record figures varying from 58.3% to 50.9%. These have been achieved without surgery.

5. If the authors desire only from radium that it should act as a "local sterilizing and healing" agent, I can assure them that deep X ray therapy alone also produces excellent

cleaning up of the primary growth, and there is the advantage that the dose on the glands is more. For these reasons it is given by many before the radium treatment.

6. It is a characteristic of the true scientific investigator that when he cannot attain results as published by others he blames his own technique.

I respectfully suggest to the authors that if they wish to produce results from radiotherapy as published by numbers of centres throughout the world, and do the best for their patients, they should continually seek to improve their radium technique with the object of attaining better distribution and extent of lethal physical dose around the cervix, and also supplement radium treatment by deep X ray therapy.

Yours, etc.,

HAROLD J. HAM.

135, Macquarie Street,
Sydney,
July 21, 1938.

TUBERCULO-SILICOSIS.

SIR: Dr. J. G. Edwards may be correct in his criticism of Dr. Moore's case of acute tuberculo-silicosis, though the latter's statement that the radiograph "was not accompanied by any symptoms or clinical signs" in the patient must throw doubt on Dr. Edwards's diagnosis of "acute tubercular spread of the exudative type". It would seem that further debate on this point might profitably be deferred until an autopsy has been held.

On one point, however, Dr. Edwards is certainly in error. He states that: "Silicosis is essentially a process of chronic pulmonary fibrosis, and unless the word 'acute' is applied to cases developing after five or six years' exposure to the hazard, it has no application to the condition."

Acute silicosis is a well-recognized disease, and cases have been reported which have occurred within twelve months after exposure to silica dust. Two trades are known to be extremely dangerous in this respect, owing to the high concentration of silica dust; they are sand-blasting and abrasive powder manufacturing. One patient under my care, a lad of twenty-two, died of acute silicosis (proved at *post mortem*) after having been employed for only eighteen months in the manufacture of a well-known abrasive soap.

Dr. Leroy U. Gardner, director of the Saranac Laboratory for the Study of Tuberculosis, and a world authority on the pneumonokonioses, in a paper in 1936, read before the New York Academy of Medicine, stated: "Under ordinary industrial conditions from five to twenty years are required to produce demonstrable silicosis but in certain exceptional occupations, such as sand-blasting without protective devices, characteristic changes have been reported in two years and even eighteen months."

It is agreed that the time factor is important in silicosis, but so also is the intensity of exposure to the dust.

Yours, etc.,

COTTER HARVEY.

137, Macquarie Street,
Sydney,
July 23, 1938.

NATIONAL HEALTH INSURANCE.

SIR: Having done two years' relieving work in Australian medical practices, and also having done several panel practices in London, as well as having been in practice for eighteen years, I would like to make the following comments on national insurance.

1. There will have to be a regional method of dealing with the capitation fee, as the incomes of members of the

British Medical Association vary enormously in different parts of the various States.

2. There are local factors, such as the miners' agreement in Kalgoorlie, and the various timber mills agreements throughout Western Australia, which are specialized forms of medical practice.

3. Operation fees vary in different districts.

4. The number of fracture cases, anaesthetics and other special kinds of medical practice are very different in the many towns and districts.

5. Hospital systems vary individually with each district.

6. The capacity to pay varies widely throughout the Commonwealth.

7. Bad debts also vary widely.

I suggest that allowances will have to be made for all these points, otherwise much unfairness, hardship and even possible financial loss on a fairly wide scale will result.

Would it be possible to introduce a sliding scale proportionate to the volume of lodge and private practice?

Yours, etc.,

H. T. ILLINGWORTH, M.B., Ch.M.

Bridgetown,
Western Australia,
July 13, 1938.

Sir: I agree with Dr. John Dale in his general condemnation of the national health insurance scheme as a means of social service. It can only have one certain result, an increase in taxation or an increase in costs of some sort, thus a deduction from wages. But I profoundly disagree with my valued friend when he considers the monetary system to be at fault. He states that the monetary system fails to effect the necessary exchanges. But I would point out that it is not the monetary system that effects exchange. Exchange is facilitated by the monetary system, but it can and does go on without the monetary system, such as exchange of goods between nations.

It is production and exchange of goods and services that call forth a monetary system, not *vice versa*, as Dr. Dale and his Douglas Credit friends believe.

Yours, etc.,

PAUL G. DANE.

110, Collins Street,
Melbourne,
July 26, 1938.

Sir: Is not the lack of enthusiasm shown by the medical profession for the introduction of national insurance due less to a low capitation fee and lack of provision for the necessary extra charges (aspects that are bad enough in themselves) than to: (a) the feelings of dislike for contract practice which will render him liable to markedly increased numbers in the surgery during consulting hours and a daily list of calls here and there inside the three- or two-mile limit for ailments which prior to the introduction of national insurance the persons issuing the calls either would not have bothered about or would have gone to the chemist for a bottle of medicine or a pot of ointment *et cetera*; (b) the fear of the development of the feeling that the patient before him is just a contract patient with more than likely some trifling ailment and consequently not really in need of an investigation of a searching character, and the realization that any attempt to take a history of the symptoms, to make the various examinations and to prescribe as well would make those waiting for their turn restive and dissatisfied with one's ways of conducting a surgery and lead to a shrinkage in one's panel list, resulting, therefore, in the tendency to develop slipshod methods in the surgery and cursory examinations in the home; (c) the fear that the cluttering up of waiting rooms with innumerable patients who, being in the insurance scheme, are bent on seeing that they get something out of it and call again and again for a repeat of this and a change of that, a note for the school-teacher, a certificate for the lodge, a form to be filled in for the

hospital fund, all those trifling time-consuming oddments which occur so much in the practice of a lodge or contract doctor, will tend to drive away the private class of patient, who in the main expects his or her twenty or thirty minutes' examination and discussion about the condition for which one is being consulted; (d) that the keeping of records, rendering of returns and filing in forms of possibly great variety would, on top of other conditions of practice already mentioned, render general practice a most tiring, unremunerative and boring existence as compared with that of present times, when cases are examined carefully, a record of their symptoms kept and treatment carried out in hospital or otherwise according to their need; (e) the fear that income from workers' compensation cases may be lost and fees for surgical and other types of work in intermediate and private wards of hospitals may be fewer in number?

In deals of many sorts a compromise often provides a satisfactory working basis. I would like to put forward the suggestion that the Royal Commission appointed for the inquiry into matters regarding national insurance should consider a compromise for the remuneration of medical men for their services, that is, the payment of a small capitation fee from the common fund, and in addition the payment by the insured person for each consultation and visit, the charge ranging from 2s. for the lower incomes for a consultation, and 2s. 6d. for a visit to, say, 4s. 6d. for a consultation and 5s. for a visit for the higher incomes, some restriction being arranged as to the number of visits and consultations which could be charged for consecutively in each year, say from twelve to twenty, after which make every other attendance only chargeable.

This would serve to protect the insured member and to discourage unnecessary calls and consultations, and a capitation rate could be struck which would be satisfactory to the medical man.

The same method could be applied to the chemist, who would receive a retaining fee per insured person and for each bottle of medicine, pot of ointment *et cetera* supplied a charge of, say, one-third of the customary charge would be made.

Repeat mixtures could be supplied by the chemist at his discretion and, on payment of the fee to the chemist, without consulting the doctor, a bottle of medicine *et cetera* could be obtained for minor maladies, as is done so commonly at present.

Should the chemist feel dubious about prescribing, he need have no hesitation about referring the case to the doctor, as there would be no additional financial inducement for him to discourage patients from going to the doctor. He too should be allowed a higher scale of charges for those insured persons in receipt of higher incomes.

I make these suggestions for the following reasons:

1. Because it is important that the medical man should not be hampered and hindered by a lot of unnecessary items of medical attendance which the introduction of national insurance, as proposed at present, seems certain to thrust upon him.

2. So that people who have in the past purposely avoided becoming contract patients may still feel they are paying their way for what they are receiving and may not be forced into what may appear to them the humiliating position of becoming lodge patients.

3. That medical men may retain their interest in their work, have reasonable time to attend to their patients in hospital and secure sufficient time off for recreation and leisure and, above all, to get their rest at night, which is so necessary for their well-being and that of the general public as well; for tiredness in a doctor is going to be reflected in his work and in his attitude towards his patients.

Other details in a satisfactory scheme appear to be the making of provision for payment for night calls, mileage, confinement fee charges, charges for specialized services likely to be carried out by the general practitioner, such as X ray examinations, pathological examinations, eye testing and treatments by electrotherapy,

carbon dioxide, administration of vaccines and sera as prophylactic treatment and, in addition, a definition of an intermediate ward patient and private patients in hospitals, with a scale of charges for attendances at hospital and for every conceivable type of operation which a general practitioner is likely to perform.

In a compromise scheme as suggested, the difficulty which arises when an insured person is forced to seek medical attention when away from the district in which his nominated medical man resides, is partly overcome, as the payment of a small fee serves to some extent to compensate the doctor who acts in lieu of the regular medical attendant.

Yours, etc.,

Kable Street,
Windsor,
July 23, 1938.

C. D. BATEMAN, M.B.

SIR: The Publicity Committee has noted the contents of Dr. Lipscomb's letter in the issue of the journal of July 30, 1938, and wishes to draw attention to the fact that, until the Royal Commission sits, there will be little authoritative information to publish.

Meetings of the various national health insurance committees of the British Medical Association are being held very frequently at present; but members of the profession will realize that the greater part of their discussions must be regarded as confidential.

This committee is of the opinion that no material should be submitted to the journal for publication unless the information it contains is accurate.

It is true, as pointed out by Dr. Lipscomb, that the journal is dependent on the Federal Council and the various Branch councils for authoritative information.

Yours, etc.,

GEORGE BELL,
W. F. SIMMONS,
J. G. HUNTER,

Members of the Publicity Committee.

British Medical Association House,
135, Macquarie Street,
Sydney.
August 1, 1938.

THE NATIONAL HEALTH INSURANCE EMERGENCY FUND.

SIR: In reference to Dr. Molesworth's letter (THE MEDICAL JOURNAL OF AUSTRALIA, July 30, 1938). The national health insurance committees, representing the general body of general practitioners in all States, were formed in response to a definite demand by members. The committees, after careful consideration and not while in a state of panic, have made certain decisions in regard to expenditure to be incurred. The fund was established for four main purposes:

1. To meet legal and witnesses' expenses of the Royal Commission.
2. To meet the legal expenses of an application to the High Court (if considered advisable) for a declaration concerning the validity of the medical benefit sections of the Act.
3. To meet the cost of meetings of the Federal and State insurance committees.
4. To provide for the advice of actuaries and economists and accountants in preparation of the case.

If, as the committee believes, none of these items is unnecessary, and if there should be prolonged disagreement between members and the National Health Insurance Commission, it is difficult to believe that too large a fund can be raised.

Dr. Molesworth considers that the fund so collected would be too large and that in consequence there would be two probable effects: (i) that public sympathy will be alienated; (ii) that there will be extravagance in its expenditure.

The committee desires to point out that the contribution is voluntary and not in the nature of a levy, and therefore the committee had reason to expect that the total amount subscribed would fall substantially short of the full amount receivable.

As to the possibility of extravagance, the committee desires to state that the costs of Federal and State committee meetings are arrived at by reimbursing attending members for the amount of first-class fares, which, in view of the very great distances travelled, are very heavy, and £1 10s. per diem in addition, to cover hotel and other travelling expenses. It will be obvious to members generally that the members of these committees are making heavy personal losses, while working to save the profession at large.

In his reference to the number of committeemen necessary, Dr. Molesworth has disclosed ignorance of the factors involved.

Had he been a member of one of the committees, he would have realized that the question at issue is one of magnitude, of endless detail, and of grave and far-reaching implications; that it is, in short, the survival or the disappearance of the present freedom and efficiency of medical practice.

How, in reason, could one man from each State be expected to assume the sole responsibility of deciding on the points involved and that only after communication by telephone and letter?

A further statement is furnished in regard to the remarks of Dr. Molesworth concerning the legal profession.

In all matters careful scrutiny of all expenditure has been and will continue to be made.

Yours, etc.,

B. T. EDYE,

President, New South Wales Branch of the British Medical Association.

R. C. TRAILL,

Chairman, National Health Insurance Committee, New South Wales Branch of the British Medical Association.

British Medical Association House,
135, Macquarie Street,
Sydney.

August 1, 1938.

National Health Insurance.

DONATION FROM THE PARENT BODY.

The Secretary of the Federal Council of the British Medical Association in Australia has received the following message from the Medical Secretary of the British Medical Association in Great Britain:

Council today voted unanimously a special additional grant of £1,000 (Australia) to Federal Council towards cost of presentation of case for profession before Royal Commission on national health insurance.

The Secretary of the Federal Council replied as follows:

President members Federal Council members of Association in Australia express sincere appreciation of sympathetic gesture and splendid grant of central Council.

NATIONAL HEALTH INSURANCE COMMITTEE OF NEW SOUTH WALES.

The New South Wales National Health Insurance Committee met on Saturday, July 30, and Sunday, July 31, 1938. Further consideration was given to the terms of reference of the Royal Commission and the presentation of the profession's case.

THE NATIONAL HEALTH INSURANCE EMERGENCY FUND.

We have been requested by the National Health Insurance Committee of the New South Wales Branch of the British Medical Association to publish the following statement:

The National Health Insurance Committee of the New South Wales Branch desires to refer to the letter of Dr. E. H. Molesworth in *THE MEDICAL JOURNAL OF AUSTRALIA* of July 30, and to express the strongest disapproval of the following paragraph:

Secondly, the fact that such a large sum would be available is sure to occasion extravagance in its expenditure. There is already evidence of this in the fantastic cost of holding a meeting of the Federal Executive (£500) and of the delegates to a State conference (£150). This example is sure to be followed by the lawyers acting for the Association. It is always found that if a large sum of money is available legal proceedings are drawn out to a much greater degree than when the funds are limited.

The committee desires to express its complete confidence in its legal representatives and has reason to know that this confidence is shared by members generally.

SERVICES EXCLUDED FROM THE SCOPE OF MEDICAL BENEFIT.

THE Federal Council has been advised by the Chairman of the National Health Insurance Commission that the services to be excluded from the scope of medical benefit under the *National Health and Pensions Insurance Act* are as follows:

Confinements.

Cases under workmen's compensation liability and similar insured risks (for example, motor accident cases where the obligation for cost of treatment can be discharged by compulsory third-party motor insurance).

Anaesthetics necessitating the presence of a second practitioner.

Venereal diseases, other than advice as to necessity for treatment and the infectivity of the condition. X ray investigation and treatment and radium treatment.

Pathological investigation, massage, electrical diagnosis and treatment.

Consultations, after full clinical investigation and adequate preliminary treatment.

Amputations.

Complicated fractures (such as fractured rib penetrating lung, fractured pelvis penetrating bladder, fractures causing lesions of nerves and large blood vessel), together with compound fractures of the larger bones (excluding phalanges) and fractures usually necessitating skilled attention of an orthopaedic surgeon (such as fractures of the femur), fractures needing open operation (including ununited fractures).

Fracture-dislocations of the larger joints (excluding phalangeal joints), dislocation of the spine or hip, or any dislocation usually necessitating the skilled attention of an orthopaedic surgeon.

Major operations. By this is meant operations

(1) involving the opening of a closed body cavity, such as the meninges, pleura, peritoneum or joint cavities;

(2) involving operation upon organs not included above, such as the uterus, kidneys, ureters, bladder, urethra, eyes, thyroid;

(3) usually requiring the attention of a specialist (including, for example, mastoid operation, dissection of tonsils, nasal septum and sinus operations, operations for the treatment of malignant disease).

Treatment usually requiring the attention of a specialist, for example: ophthalmological treatment not ordinarily performed by a general practitioner, treatment of special skin complaints requiring the attention of a skin specialist. Specialized treatment of the more serious bone and joint diseases, for example: surgical tuberculosis, osteomyelitis and suppurative arthritis; and specialist treatment necessitating the services of a neurologist or psychiatrist.

Summary.

Confinements.

Workmen's compensation liability and similar insured risks.

Anaesthetics necessitating the attendance of another practitioner.

Venereal disease other than giving advice as to the necessity for treatment and the infectivity of the condition.

Major operations.

Specialist treatment and investigation:

1. X rays.
2. Radium.
3. Complicated, compound, ununited and more serious types of fractures.
4. Amputations.
5. Special skin diseases.
6. Special eye diseases.
7. Special diseases of bones and joints.
8. Massage.
9. Electrical diagnosis and treatment.
10. Neurologist or psychiatrist.
11. Consultation.

Analytical Department.

TRINESIUM.

"TRINESIUM" is a product of Frederick Stearns and Company. It is stated to be magnesium trisilicate of high quality, suitable for use in the treatment of patients with gastro-intestinal disorders. The sample examined by us was a smooth fine powder in which no evidence of grit could be detected by the tongue or teeth. We have submitted a sample to our analyst, who reports as follows:

We have examined the sample of "Trinesium" submitted by you and found as follows:

MgO	20.83%	Ratio, MgO:SiO ₂	1:2.59
SiO ₂	54.03%	SiO ₂ in excess ..	15.8%
Loss on Ignition	22.36%	Antacid value: N/20 HCl	per 1 grammie ignited
Fe ₂ O ₃ , Al ₂ O ₃	1.09%		weight = 243 c.c.
CaO	0.53%		

Comparison of these figures with those given in *The British Medical Journal*, October 16, 1937, page 735, shows that the sample does not compare well with the best of the samples referred to by Mutch. There is an excess of SiO₂, and the neutralizing value is correspondingly low.

In view of the time required for the determination of adsorptive capacity we have not carried out this determination, but reference to the figures given by Mutch shows that one might expect this sample to possess reasonably good adsorption for methylene blue despite the excess SiO₂ and deficiency in antacid value.

We would draw our readers' attention to the paper by N. Mutch, which appeared in *The British Medical Journal* of October 16, 1937. Mutch gives the ideal ratio of magnesia to silica (as found in natural sepiolite) as 1:2.24. It will be seen that the ratio of magnesia to silica in "Trinesium" is 1:2.59. We believe that "Trinesium", although its neutralizing value is apparently slightly below the ideal, is suitable for use in the treat-

ment of patients suffering from any of the various conditions in which magnesium trisilicate might be employed. It is an elegant preparation and can be prescribed with confidence.

Obituary.

CHARLES SAUNDERS RENWICK.

We regret to announce the death of Dr. Charles Saunders Renwick, which occurred on July 29, 1938, at West Wallsend, New South Wales.

Books Received.

A TEXTBOOK OF CLINICAL PATHOLOGY, edited by R. R. Kracke, with the assistance of the following contributors: A. P. Briggs, L. W. Diggs, G. Hermann, F. M. Johns, F. B. Johnson, R. McBurney, H. E. Melaney, A. J. Miller, F. P. Parker, V. P. Sydenstricker, J. G. Wahlin; 1938. London: Baillière, Tindall and Cox. Medium 8vo, pp. 582, with illustrations. Price: 27s. net.

INTRODUCTION TO DISEASES OF THE CHEST, by J. Maxwell, M.D., F.R.C.P.; 1938. London: Hodder and Stoughton Limited. Demy 8vo, pp. 340, with illustrations. Price: 12s. 6d. net.

THE SHIP SURGEON'S HANDBOOK, by B. J. Macaulay, M.D., L.R.C.P., L.R.C.S.; 1938. Bristol: John Wright and Sons Limited; London: Simpkin Marshall Limited. Foolscap 8vo, pp. 66. Price: 3s. 6d. net.

THE HYPOTHALAMUS: MORPHOLOGICAL, FUNCTIONAL AND SURGICAL ASPECTS, by W. E. Le Gros Clark, D.Sc., F.R.C.S., F.R.S., J. Beattie, M.D., D.Sc., G. Riddoch, M.D., F.R.C.P., and N. M. Dott, F.R.C.S.; 1938. Edinburgh: Oliver and Boyd, for the William Ramsay Henderson Trust. Crown 4to, pp. 223, with over 100 illustrations. Price: 12s. 6d. net.

Diary for the Month.

AUG. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 AUG. 12.—Queensland Branch, B.M.A.: Council.
 AUG. 16.—New South Wales Branch, B.M.A.: Ethics Committee.
 AUG. 17.—Western Australian Branch, B.M.A.: Branch.
 AUG. 18.—New South Wales Branch, B.M.A.: Clinical Meeting.
 AUG. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 AUG. 24.—Victorian Branch, B.M.A.: Council.
 AUG. 25.—South Australian Branch, B.M.A.: Branch.
 AUG. 26.—New South Wales Branch, B.M.A.: Branch.
 AUG. 26.—Queensland Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", page xxii to xxv.

BALMAIN AND DISTRICT HOSPITAL, BALMAIN, NEW SOUTH WALES: Honorary Ear, Nose and Throat Surgeon.

CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

COMMONWEALTH OF AUSTRALIA, DEPARTMENT OF HEALTH, CANBERRA, FEDERAL CAPITAL TERRITORY: Medical Officer.

QUEEN VICTORIA HOME AND THE BODINGTON RED CROSS SANATORIUM, WENTWORTH FALLS, NEW SOUTH WALES: Medical Superintendent.

ROYAL AUSTRALIAN AIR FORCE: Medical Officers.

ROYAL HOSPITAL FOR WOMEN, PADDINGTON, NEW SOUTH WALES: Junior Resident Medical Officer.

ST. GEORGE DISTRICT HOSPITAL, KOGARAH, NEW SOUTH WALES: Honorary Assistant Surgeon, Resident Medical Officers.

THE LORD HOWE ISLAND BOARD OF CONTROL: Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not members of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.